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Response Action Contract IX

FIVE-YEAR REVIEW REPORT

FOR
BURBANK OPERABLE UNIT
SAN FERNANDO VALLEY (AREA 1) SUPERFUND
LOS ANGELES COUNTY, CALIFORNIA

September 2004

U.S. Environmental Protection Agency
Contract No. 68-W-98-225

CH2M HILL, Inc.
and Team Subcontractors:
URS Group, Inc.
E2 Consulting Engineers, Inc.

FIVE-YEAR REVIEW REPORT

FOR
BURBANK OPERABLE UNIT
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

September 2004

Prepared for
Contract No. 68-W-98-225/WA NO. 052-TBTA-09DM
United States Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California 94105

Approved by:

Elizabeth Adams

Elizabeth Adams
Chief, Site Cleanup Branch
EPA, Region 9

Date:

September 29, 2004

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BOU	Burbank Operable Unit
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituents of concern
DCE	dichloroethene
DHS	California Department of Health Services
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GAC	granular activated carbon
gpm	gallons per minute
IOP	Interim Operations Plan
LADWP	Los Angeles Department of Water and Power
LPGAC	liquid-phase granular-activated carbon
MCL	maximum contaminant level
MtBE	methyl *tertiary*-butyl ether
MWD	Metropolitan Water District
µg/L	micrograms per liter
mg/L	milligrams per liter
NHOU	North Hollywood Operable Unit
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PCE	perchloroethylene

pCi/L	picocuries per liter
PHG	public health goal
PRP	potentially responsible party
QA/QC	quality assurance / quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAL	State Action Level
SARA	Superfund Amendments and Reauthorization Act
SCAQMD	South Coast Air Quality Management District
SDWA	Safe Drinking Water Act
SFV	San Fernando Valley
SVOC	semivolatile organic compounds
TBC	to be considered
TCE	tricholoethylene
1,2,3-TCP	1,2,3-trichloropropane
UAO	Unilateral Administrative Order
ULARA	Upper Los Angeles River Area
VOC	volatile organic compound
VPGAC	vapor phase granular activated carbon

Five-year Review Summary Form

SITE IDENTIFICATION
Site name : Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
EPA ID: CAD980894893 **CERCLIS ID :** 09N1
Region: IX **State:** CA **City/County:** Burbank / Los Angeles
SITE STATUS
NPL status: ■ Final ❑ Deleted ❑ Other (specify) ____________
Remediation status (choose all that apply): ■ Operating ❑ Complete
Multiple OUs? ■ YES ❑ NO **Construction completion date:** N/A North Hollywood OU, Burbank OU
Has site been put into reuse? ■ YES ❑ NO
REVIEW STATUS
Reviewing agency: ■ EPA ❑ State ❑ Tribe ❑ Other Federal Agency ____________
Author name: Rachel Loftin
Author title: Remedial Project Manager **Author affiliation:** EPA Region IX
Review period: May – September 2004
Date(s) of site inspection: June 1, 2004
Type of review: ■ Statutory ❑ Policy ❑ Post-SARA ❑ Pre-SARA ❑ NPL-Removal only ❑ Non-NPL Remedial Action Site ❑ NPL State/Tribe-lead ❑ Regional Discretion)

Review number: ■ 1 (first) ❑ 2 (second) ❑ 3 (third) ❑ Other (specify)

Triggering action:

■ Actual RA Onsite Construction at OU

❑ Actual RA

❑ Previous Five-year Review Report

❑ Construction Completion

❑ Other (specify) ______________________________

Triggering action date: November 22, 1993

Due date (five years after triggering action date): 1998. This five-year review was conducted in 2004; it is overdue from the triggering action date because of phased implementation of the remedy, with Phase II treatment operations commencing December 1998.

Issues and Recommendations:

Issue

The treatment system has rarely operated at the 9,000-gallons per minute (gpm) capacity, as mandated in the second Consent Decree.

Recommendations

1. Proceed with the performance attainment study, as planned for 2004-2005, to evaluate and identify alternatives for increasing the continuous flow rate to meet the 9,000 gpm capacity goal, including evaluation of the well field mechanics and hydraulic delivery system.
2. Evaluate and modify, where needed, operation and maintenance (O&M) practices that influence system downtime. For example, evaluate changes to the programmable logic controller necessary to avoid stripper shutdown and reduce surging due to well discharge valve cycling.
3. Periodically evaluate wellfield mechanics, hydraulic capacity, and the pumping plan to ensure capture of the plume and contaminant mass removal.

Issue

The emergence of new constituents of concern (COCs), such as chromium and 1,2,3-trichloropropane (1,2,3-TCP), in plant effluent samples, and premature liquid-phase granular-activated carbon (LPGAC) breakthrough have caused decreased overall pumping rates and caused a reliance on well blending to decrease concentrations. For total chromium, the wells blending is utilized, when necessary, to decrease the concentration to 10 micrograms per liter (µg/L) or less, at the air stripper influent.

Recommendation

1. Continue to evaluate and address 1,2,3-TCP breakthrough from both a mechanical and chemical perspective. Specifically, backwash procedures, the presence of carbon fines, and the potential for chemical interactions influencing the preferential adsorption, as previously identified.
2. Evaluate and revise chromium and 1,2,3-TCP blending and pumping plans by November 30, 2004. Conduct annual evaluations thereafter.
3. The City of Burbank should submit a pumping plan, indicating how the flow rates for each of the BOU extraction wells will be managed to meet the maximum contaminant level for total chromium and the

State Action Level (SAL) for 1,2,3-TCP for United States Environmental Protection Agency's (EPA) review and approval, by November 30, 2004.

Issue

Regional groundwater plume maps and local groundwater data from select wells indicate increasing concentrations of volatile organic compounds (VOCs) in the B-zone and a hydraulic influence in the vicinity of the Burbank Operable Unit (BOU) treatment system. Concentrations in the B-zone are substantially less than the A-zone, therefore pumping from this zone is not the most efficient way to capture the high concentration mass of VOCs in the BOU area. Well packers may be leaking, allowing for downward migration of contamination.

Recommendations

1. Ensure all packers are operating as intended. Identify any maintenance issues and repair promptly as needed.
2. As a part of the performance attainment study, include methods for evaluating vertical migration.

Issue

Should the City of Burbank resume pumping their current wellfield or install new wells in the vicinity, there could be effects on plume migration and capture within the BOU. The hydraulic influence of pumping of nearby production wellfields can be seen throughout Area 1.

Recommendation

1. An institutional control should be put in place to ensure that planned groundwater activities in the vicinity of the BOU do not decrease the performance of the treatment plant without a thorough evaluation by EPA.
2. Because of adjudicated water rights groundwater extraction and spreading within the San Fernando Valley (SFV) is monitored by the Upper Los Angeles River Area (ULARA) Watermaster. Public water supply purveyors in the SFV are subject to California Department of Health Services (DHS) oversight which includes evaluation of proposed new sources, reporting of current drinking water sources (condition and amounts), and vulnerability assessments. The ULARA Watermaster and DHS should provide annual updates to EPA of the activities within the BOU hydraulic area of influence.

Issue

Recent air emissions data measured at vapor phase granular activated carbon (VPGAC) units is much greater than the 2000 data used to calculate maximum individual cancer risk. Additionally, the BOU is located within 1000 feet of the outer limits of a school; therefore the risk associated with air emissions should be reevaluated in terms of South Coast Air Quality Management District (SCAQMD) regulations.

Recommendation

1. Evaluate the maximum individual cancer risk for BOU receptors based on recent air emissions data in accordance with SCAQMD regulations; implement air modeling and corrective measures as needed.
2. Continue to report quarterly air emissions data in reports submitted to EPA.
3. Currently carbon is regenerated every 10 days. This will be reduced to every 8 days (as of September 2004).
4. Conduct an air monitoring test consisting of collecting air emissions samples daily during the 8 day cycle to determine if the carbon regeneration cycle needs to be reduced even further (by October 30, 2004).

Issue

National Pollutant Discharge Elimination System (NPDES) sampling is not comprehensive as it does not include handling and disposal of backwash water. The City of Burbank prepares and submits NPDES sampling results, however the reports do not include a comparison to acceptable discharge limits.

Recommendations

1. Proceed with collecting and analyzing backwash samples as per EPA request.
2. Cease discharging backwash water through bag house filters to the storm drain until results are available, particularly backwash water generated once the carbon bed has been in use.
3. Modify and document backwash water handling procedures as needed to ensure discharge under NPDES is in compliance. Provide training to plant operations staff on new procedures.
4. Continue to include NPDES monthly sampling data in a table format which shows results compared to the allowable discharge limits, in the monthly reports submitted to EPA.

Issue

Emerging contaminants such as 1,2,3-TCP and chromium have influenced operational efficiency at the BOU. The BOU treatment system is capable of remediating 1,2,3-TCP impacted groundwater; however because of the low SAL, breakthrough at the LPGAC is premature and sometimes unpredictable. The BOU treatment system is not designed to remediate chromium. Ongoing monitoring of upgradient wells for potential new COCs should continue to allow for effective management and continued operations of the BOU treatment system.

Recommendation

1. Continue to monitor wells upgradient of the BOU for known emerging contaminants.
2. Evaluate spatial distribution and concentration with respect to the BOU extraction well network semi-annually.
3. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated maximum contaminant levels or risk-based treatment standards should be performed.

Protectiveness Statement:

The assessment of this five-year review found that the interim remedy for the BOU was constructed in accordance with the ROD and ESDs and is currently protective of human health and the environment; the concentrations of TCE and PCE in BOU treatment system effluent are less than regulatory cleanup goals. Additionally, the concentration of nitrate in treated groundwater after the blending point is less than regulatory cleanup goals and no other potential constituents of concern currently exceed health-based standards in water from the blendpoint. While current air emissions may be within EPA's risk range of 10^{-4} to 10^{-6}, an air emissions evaluation will need to be conducted in order to determine air protectiveness at the BOU. *The findings of this review and the North Hollywood OU (NHOU) five-year review,* which was completed in September 2003, both concluded that VOC plume containment should be evaluated and addressed to ensure continued protectiveness. In addition, the City of Burbank should continue ongoing sampling and reporting of extraction well concentrations of emerging contaminants, such as 1,2,3-TCP (weekly), total chromium (monthly), hexavalent chromium, 1,4-dioxane (weekly), and perchlorate (annually)—COCs not previously identified for treatment in EPA decision documents. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated maximum contaminant levels or risk-based treatment standards should be performed.

In the future, protectiveness determinations will be made for Area 1 (BOU and NHOU) together as a whole. The next five-year review for Area 1 will be conducted on or before September 2009.

Report

Five-year Review Report
Burbank Operable Unit
San Fernando Valley (Area 1)
Superfund Site
Los Angeles County, California

Prepared for

United States Environmental Protection Agency, Region 9

September, 2004

Prepared by

CH2MHILL

155 Grand Avenue, Suite 1000
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Executive Summary

A five-year review of the Burbank Operable Unit (BOU) of the San Fernando Valley (SFV) (Area 1) Superfund Site in Los Angeles County, California was completed in September 2004. The five-year review was required by statute and performed because hazardous substances, pollutants, or contaminants remain at the BOU above levels that do not allow for unrestricted use and unlimited exposure. The triggering action for this review was the remedial action start date of November 22, 1993 from EPA's Superfund Program database, CERCLIS.

Area 1 encompasses approximately 4 square miles and contains an area of volatile organic compound (VOC)-contaminated groundwater that defines the North Hollywood OU (NHOU) and the BOU. The third five year review for the NHOU was completed in September 2003. Section 5 of this five year review includes updates on the recommendations that have been implemented at the NHOU since September 2003. It is planned that the next five year review in 2009 will cover all of Area 1 (i.e. the Burbank and North Hollywood OUs). The protectiveness statement for Area 1 as a whole was deferred until completion of this five year review.

Until the 1980's, the City of Burbank produced water for public use from production wells within the BOU. In 1980, the California Department of Health (DOH, currently called the California Department of Health Services (DHS)) requested that all major water providers sample and analyze groundwater for contamination. Trichloroethylene (TCE) and perchloroethylene (PCE) were detected consistently in a large number of production wells within Area 1 at concentrations greater than the maximum contaminant level (MCL) for drinking water. As a result, the Environmental Protection Agency (EPA) provided federal funding for the Los Angeles Department of Water and Power to conduct a two-year study to define the extent of contamination. The results of the study, published in 1983, revealed widespread VOC-contaminated groundwater in the SFV.

Area 1 was added to the National Priorities List in 1986. In October 1988 the BOU Feasibility Study was completed.

The Record of Decision (ROD) for an interim groundwater remedy at the BOU was signed June 1989. The selected interim remedy addressed the VOC-contaminated groundwater plume in the Burbank area. The objectives as stated in the ROD included VOC plume containment and treatment of extracted groundwater to concentrations less than MCLs or state action levels (SALs) using groundwater extraction, air-stripping, and vapor-phase granular-activated carbon (VPGAC).

An Explanation of Significant Differences (ESD) was signed in November 1990 to clarify some statements in the ROD. Specifically, blending could be used to reduce the concentration of nitrates in extracted groundwater to less than the MCL of 45 milligrams per liter (mg/L). The nitrate blending requirement would increase the total amount of water produced from the treatment facility. EPA required reinjection of excess treated water back into the aquifer. ESD #1 also documented that the remedial action would be designed, constructed, and implemented in phases. Phase I included design and construction of a 6,000 gallons per minute (gpm) treatment system. Phases II and III planned for additional 3,000 gpm capacity, respectively, for a total capacity of 12,000 gpm.

In March 1992, EPA entered into a Consent Decree with Lockheed Martin, the City of Burbank, and Weber Aircraft, Inc. The Consent Decree stipulated that Lockheed Martin was to design and construct a 12,000-gpm groundwater extraction and treatment system that must meet MCLs and SALs, with the exception of nitrate. Furthermore, Lockheed Martin would operate the system for 2 years at Phase III capacity. In February 1997, ESD #2 was signed and eliminated the need for Phase III (additional 3,000 gpm) based upon the determination that an extraction rate of 9,000 gpm would result in the same level of plume containment and mass removal as 12,000 gpm. This eliminated the need for reinjection.

In June 1998, a second Consent Decree was entered. This provided for continued operations and maintenance of the BOU treatment system by the City of Burbank for 18 years at 9,000 gpm. Funding was to be provided by a trust fund established and funded by parties to the Consent Decree.

Current system operations include pumping groundwater from eight extraction wells to a vertical air stripping column containing a packing medium (to increase surface area) through which a countercurrent flow of air is introduced. Air emissions are filtered through VPGAC to remove VOCs, prior to release to the atmosphere. Treated groundwater (effluent) is conveyed to liquid-phase granular-activated carbon (LPGAC) beds to remove residual VOCs. The treated groundwater is then discharged to the City's Valley Forebay for disinfection and storage, then to the blending facility. Here, the groundwater is blended with water from Metropolitan Water District to decrease the nitrate concentration per ESD #1, prior to distribution to consumers. Construction of Phase I of the groundwater treatment system was completed 1994 and operation commenced in 1996. Construction of Phase II was completed in 1998 and operation commenced December 1998. As stated earlier, ESD #2 eliminated the need for implementing Phase III.

The groundwater treatment system has operated from 1996 to the present, with downtime attributed to unexpected maintenance/design issues, new chemicals of concern (primarily 1,2,3-trichloropropane (1,2,3-TCP)), and well pump and controls problems. The concentration of PCE and TCE in groundwater effluent from the treatment system has been less than MCLs. Treated groundwater from the blendpoint, which is served to consumers, has met all DHS contaminant goals set forth in the operating permit, as well as the drinking water MCL cleanup goals stated in ESD #1.

The treatment system has rarely operated at the intended 9,000 gallons per minute design capacity due to operation and maintenance issues, design constraints, and the presence of 1,2,3-TCP. Complete vertical containment of the PCE and TCE groundwater plumes is in question based on data from 1999 to 2003. The BOU treatment system is operating under substantive requirements of National Pollutant Discharge Elimination System (NPDES) and South Coast Air Quality Management District (SCAQMD) permits for water and air emissions respectively. NPDES discharge sampling is not completely representative of discharge to the storm drain because only the discharge from the secondary LPGAC units (Tank 600) is sampled. This does not include water used to backwash the primary LPGAC units which is discharged through bag house filters to the storm drain. Sampling of the backwash discharge water should be conducted and appropriate disposal implemented. All sampling results should be presented in comparison to NPDES discharge limits.

Air emissions data show an increase in TCE and PCE concentrations since maximum individual cancer risk was evaluated in 2000. Because of this increase and the fact that the BOU is located within 1000 feet of the outer boundaries of a school, air emissions data should be further evaluated in accordance with SCAQMD regulations.

The assessment of this five-year review found that the interim remedy for the BOU was constructed in accordance with the ROD and ESDs and is currently protective of human health and the environment; the concentrations of TCE and PCE in BOU treatment system effluent are less than regulatory cleanup goals. Additionally, the concentration of nitrate in treated groundwater after the blending point is less than regulatory cleanup goals and no other potential constituents of concern currently exceed health-based standards in water from the blendpoint. While current air emissions may be within EPA's risk range of 10^{-4} to 10^{-6}, an air emissions evaluation will need to be conducted in order to determine air protectiveness at the BOU. The findings of this review and the NHOU five-year review, which was completed in September 2003, both concluded that VOC plume containment should be evaluated and addressed to ensure continued protectiveness. In addition, the City of Burbank should continue ongoing sampling and reporting of extraction well concentrations of emerging contaminants, such as 1,2,3-TCP (weekly), total chromium (monthly), hexavalent chromium, 1,4-dioxane (weekly), and perchlorate (annually)—COCs not previously identified for treatment in EPA decision documents. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated maximum contaminant levels or risk-based treatment standards should be performed.

In the future, protectiveness determinations will be made for Area 1 (BOU and NHOU) together as a whole. The next five-year review for Area 1 will be conducted on or before September 2009.

1.0 Introduction

The United States Environmental Protection Agency (EPA) conducted a five-year review of the remedial actions implemented at the Burbank Operable Unit (BOU) of the San Fernando Valley (SFV) (Area 1) Superfund Site, in Los Angeles County, California (Figure 1-1). This review was conducted from May to September 2004.

The five-year review process evaluates whether the remedy at the BOU remains protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify any deficiencies found during the review and provide recommendations for addressing these deficiencies.

This review is required by federal statute. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). CERCLA Section 121(c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the BOU, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

Consequently, this five-year review report has been completed because hazardous substances, pollutants, or contaminants remain at the BOU above levels that allow for unrestricted use and unlimited exposure.

Area 1 includes two operable units (OU): North Hollywood (NHOU) and Burbank. This is the first five-year review report for the BOU. The triggering action for the Burbank five-year review report is the remedial action start date of November 22, 1993. This report evaluates the BOU interim remedy (remedy) objectives as stated in the Record of Decision (ROD), Explanation of Significant Differences (ESD) #1, and ESD #2. This report also provides an update to progress on issues and recommendations made in the recent NHOU five-year review report (CH2M HILL 2003c) to lay the foundation for a comprehensive Area 1 five-year review report in 2009.

This report is organized into sections that describe the history and setting of the OU, remedial action decisions and implementation, and an evaluation of remedial actions. These sections are:

- Section 2.0: Chronology of BOU events.
- Section 3.0: Land use, BOU setting, the history of contamination, and initial response.
- Section 4.0: The remedial action implemented at the BOU, current status of the remedy, and treatment system operation and maintenance (O&M) activities and cost.
- Section 5.0: Progress since the last five-year review.

- Section 6.0: Activities performed during the five-year review process.
- Section 7.0: Technical assessment of the remedial action implemented at the BOU.
- Section 8.0: Issues at the BOU are identified and recommendations provided.
- Section 9.0: Protectiveness statement for Area 1.
- Section 10.0: Next five-year review.
- Section 11.0: List of works cited during the preparation of this document.

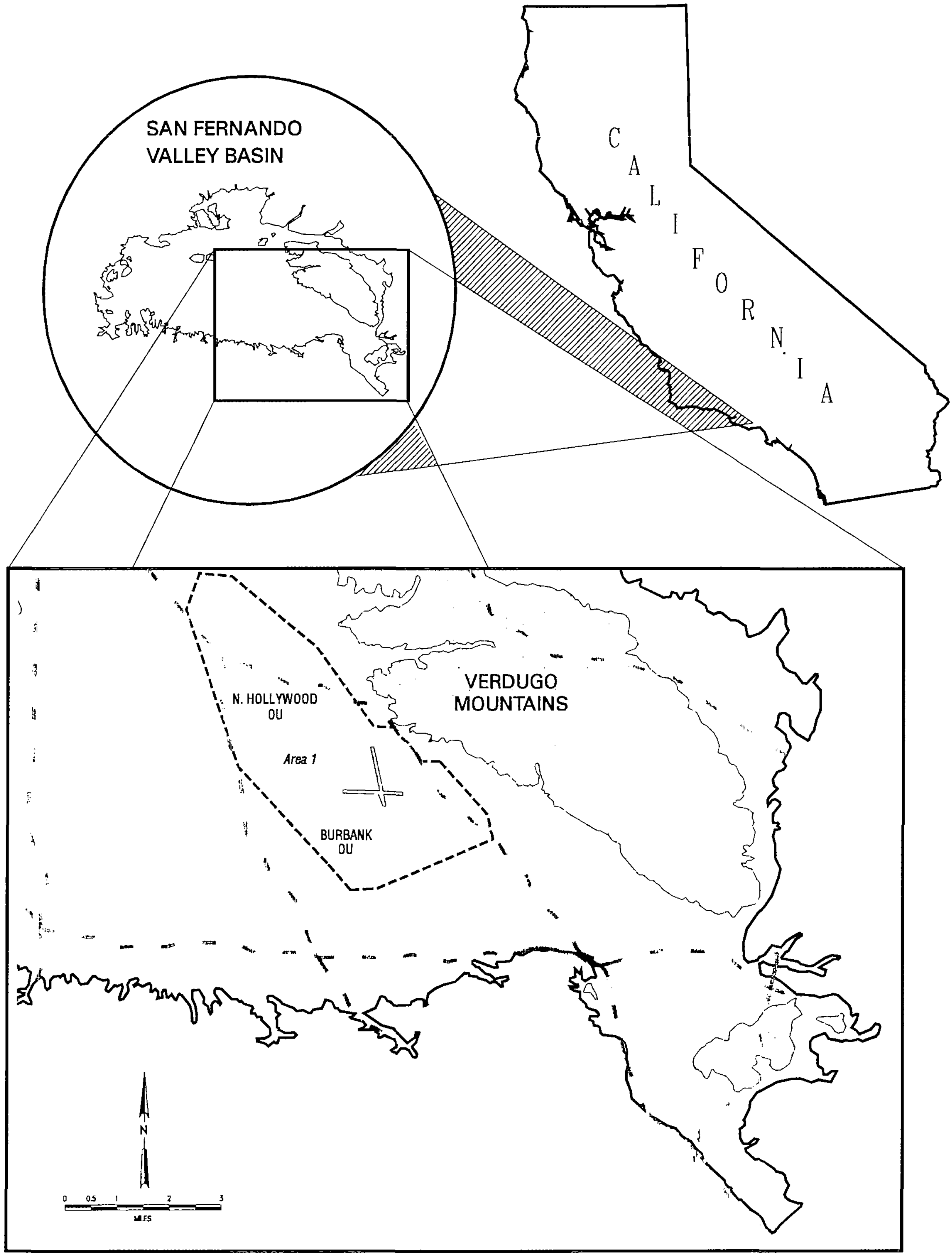


FIGURE 1-1
SITE LOCATION MAP
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

CH2MHILL

2.0 Site Chronology

Table 2-1 provides a chronology of events at the BOU.

TABLE 2-1
Chronology of BOU Events
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Event	Date
Numerous aerospace, aircraft manufacturing and related industries operated in the Burbank Operable Unit (BOU) Area. Lockheed Martin Plant B-1 operated for aerospace and aircraft manufacturing in the BOU Area.	1928-1990
First production wells in the current Burbank well fields constructed. Earlier production wells have been destroyed.	1942
State Supreme Court granted City of Burbank the right to extract 20 percent of the imported and reclaimed water for domestic use. Received credits for recharging treated wastewater effluent.	1979
Water rights in the Upper Los Angeles River Area (ULARA) set forth in a Final Judgment. Supreme Court appoints Watermaster.	1979
As a result of the passage of Assembly Bill 1803, California Department of Health Services (DHS) requested all major groundwater purveyors test for the presence of industrial chemicals.	1979
Congress enacted Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).	1980
DHS detected trichloroethylene (TCE), perchloroethylene (PCE), and other volatile organic compounds (VOCs) in a large number of production wells exceeding respective maximum contaminant level (MCL) and/or State Action Level (SAL); those wells were removed from service. Alternative water supply was obtained from the Metropolitan Water District (MWD) where needed.	1980
Los Angeles Department of Water and Power (LADWP) and Southern California Association of Governments began a two-year study funded by the United States Environmental Agency (EPA) entitled *Groundwater Management Plan – San Fernando Valley Basin.*	1981
Groundwater Management Plan – San Fernando Valley Basin completed. The study detected widespread VOC contamination in the eastern San Fernando Valley and also located a contaminant plume migrating to the southeast at 300 feet per year.	July 1983
SFV (Area 1) Superfund Site proposed for listing on the National Priorities List (NPL).	1984
SFV (Area 1) Superfund Site was placed on the NPL.	June 1986
Congress passed Superfund Amendments and Reauthorization Act (SARA) and added $8.5 billion to the Superfund (CERCLA) program.	1986
TCE found at concentrations exceeding SAL on 48 percent of SFV's 120 production wells.	1987
Initiated basin-wide remedial investigation/feasibility study (RI/FS) under LADWP lead.	1987

TABLE 2-1
Chronology of BOU Events
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Event	Date
Los Angeles Regional Water Quality Control Board (RWQCB) began source investigation activities.	1987
RWQCB issued Cleanup and Abatement Order No. 87-161 directing Lockheed to implement specific assessment and remediation tasks.	December 1987
BOU feasibility study completed. City of Burbank Public Service Department Well 10 contained concentration of TCE of 1,800 micrograms per liter (µg/L) and a PCE concentration of 590 µg/L.	October 1988
Record of Decision (ROD) signed for interim groundwater remedy of 20-year pump and treat to contain the groundwater plume and remove TCE and PCE from extracted groundwater to concentrations below the MCL.	June 1989
Explanation of Significant Differences #1 (ESD #1) signed to clarify the following: blending could be used to reduce nitrate concentrations in treatment system effluent, reinjection of excess treated water would be required, the remedy could be implemented in phases, and clarification that the ROD statement pertaining to plume containment (of specified concentration and constituent) was not a statement of remedial action.	November 1990
Unilateral Administrative Order (UAO) 92-12 issued by EPA to six potentially responsible parties (PRPs).	March 1992
Consent Decree signed by EPA, City of Burbank, Weber Aircraft, and Lockheed Martin.	March 1992
RI/FS of entire San Fernando Valley completed (including Area 1).	December 1992
Basin-wide groundwater monitoring program established (sampling of 84 wells).	1992
Phase I BOU treatment plant constructed.	Summer 1993 – Spring 1994
Final Remedial Design Report submitted and approved by EPA.	November 1993
Blending facility construction completed.	July 1995
Blending facility fully operational.	December 1995
Phase 1 operational (6,000 gallons per minute [gpm] capacity).	January 1996
ESD #2 signed. This eliminated the need for phase III (additional 3,000 gpm) and reinjection of treated water. The new extraction rate would be calculated as average flow.	February 1997
EPA directed Lockheed to change liquid-phase granular-activated carbon (LPGAC) carbon bed configuration from upflow to downflow.	July 1997
Phase II BOU treatment plant constructed.	October 1997 – December 1997
Entire BOU treatment system shut down due to total VOC concentrations from Tank 600 (carbon regeneration condensate) in excess of concentration of temporary approval letter.	June 1998
Consent Decree #2 signed by EPA, City of Burbank, Weber Aircraft, Lockheed, parties under UAO 92-2, and other parties.	June 1998

TABLE 2-1
Chronology of BOU Events
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Event	Date
Second Phase of Operation of Burbank Operable Unit initiated (9,000 gpm).	December 1998
EPA initiated chromium source investigation by providing funds to RWQCB to investigate 4,040 potential chromium users in the SFV.	January 1999
San Fernando Valley (SFV) groundwater was analyzed for methyl *tertiary*-butyl ether (MtBE).	1999
The Office of Environmental Health Hazard Assessment (OEHHA) of California EPA formally adopted a public health goal (PHG) for total chromium of 2.5 µg/L. The PHG assumed a concentration of 0.2 µg/L for hexavalent chromium.	February 1999
First sustained production of over 8,000 gpm achieved from the BOU treatment system.	May 1999
Chromium Blending Plan for well VO-1 submitted to DHS.	June 1999
Modifications to Tank 600 completed.	August 1999
Treatment system restarted.	August 1999
1,2,3-trichloropropane detected in BOU treatment plant effluent.	June 2000
Lockheed Martin submitted a *force majeure* claim to EPA regarding inability to operate at 9,000 gpm.	Fall 2000
City of Burbank assumed responsibility of operation and maintenance (O&M) of BOU.	December 2000
Office of Environmental Health Hazard Assessment (OEHHA) withdrew PHG of 2.5 µg/L after a study by Chromium Toxicity Review Committee concluded that the California total chromium MCL of 50 µg/L is protective.	November 2001
EPA provided written notice to Lockheed Martin that it was out of compliance with requirement to produce 9,000 gpm from June 13, 2000 to July 2, 2001. EPA demanded stipulated penalties.	May 2002
RWQCB completed *Chromium Investigation: San Fernando Valley Phase I; Inspections Final Report*; further assessment was recommended for 105 sites. RWQCB issued four Cleanup and Abatement orders.	August 2002
LPGAC retrofit completed.	January 2004

3.0 Site Background

The San Fernando Valley Area 1 Superfund Site is defined by an area of VOC-contaminated groundwater that encompasses approximately 4 square miles beneath the Cities of Los Angeles and Burbank within the Upper Los Angeles River Area (ULARA).

3.1 Land and Resource Use

Land use in the vicinity of the BOU is a mix of residential, commercial, and industrial. The outer boundary of a school is located less than 1,000 ft from the BOU treatment facility (EarthTech 2000).

The SFV (also referred to in this report as "the basin") is an important source of drinking water for the Los Angeles metropolitan area. The SFV is located in the ULARA, which is under adjudicated water rights regulated by the ULARA Watermaster (ULARA 2003a). There are 10 production well fields in the SFV and more than 60 drinking water supply wells located within Area 1. LADWP produces groundwater for public distribution from five well fields in the vicinity of Area 1. The well fields are: North Hollywood, Rinaldi-Toluca, Tujunga, Verdugo, and Whitnall (Figure 3-2). Of these well fields, North Hollywood, Rinaldi-Toluca, and Tujunga are the primary production areas accounting for approximately 88 percent of LADWP's total extraction from the SFV (EPA 1987). The BOU treatment facility and extraction wells are located down- and cross-gradient from the primary well fields. The NHOU extraction wells are located west-northwest of the BOU. The BOU treatment system accounts for approximately 50 percent of the City of Burbank's water supply. The City of Burbank has six production wells in the vicinity of the BOU: two have had equipment removed, two are in inactive status with California DHS, and two are on active status with DHS but not in use (standby only). The locations of the City of Burbank production wells are shown on Figure 3-1.

The treatment facility for the BOU is located at 3200 Monterey Avenue, Burbank. There are eight extraction wells associated with the BOU treatment facility (Figure 3-1). Three of these (VO-5, VO-6, and VO-7) are located along Vanowen Street. Four extraction wells (VO-1, VO-2, VO-3, and VO-4) are located along the former southern fenceline of Lockheed Martin's Plant B-1 area. This area was redeveloped for commercial use in approximately 2002. Extraction well VO-8 is located adjacent to the treatment facility, in the parking lot of the Fire Department Training Center.

3.2 Physical Setting

Area 1 lies within the SFV, which is a 112,000-acre broad trough in the south-central portion of the Transverse Ranges. The SFV is bordered on the east by the Verdugo Mountains, on the west by the Simi Hills, on the north by the Santa Susana and San Gabriel Mountains, and on the south by the Santa Monica Mountains. Average annual precipitation in the SFV (valley floor) is 16.48 inches, however during Water Year 2001-2002 (October 1 to September

30) the total was 5.95 inches, well below average (ULARA Watermaster 2003a). Spreading grounds spread water across the surface to recharge the aquifer. There are no spreading grounds within the BOU area—the closest are located upgradient of Area 1 (Simon Hydro-Search 1993). The BOU treatment facility is located approximately 3.5 miles north of the Los Angeles River.

3.2.1 Geology/Hydrogeology

The uplands surrounding the SFV are comprised of crystalline and sedimentary rocks. Quaternary alluvium up to 2,000 feet thick was derived by erosion of the surrounding uplands (RWQCB 2002). Lateral zonation is present due to the changes in the pattern of deposition of the Tujunga fan at the northeast corner of the SFV (Figure 3-3).

Area 1 (which includes the BOU) is located in the eastern half of the SFV, where alluvial fill is more than 1,200 feet thick (CH2M HILL 1998). The alluvial fill comprises sand and gravel, with interbedded lenses of clay and silt (EPA 1987). The Verdugo fault zone is an important hydrogeologic feature in the area of the BOU. The Verdugo fault zone is less permeable than adjacent aquifer materials and restricts groundwater flow, resulting in steep gradients across the fault zone (Simon Hydro-Search 1993). The northwest trending Verdugo Fault Zone and Burbank Fault parallel the northeastern boundary of the BOU (Tetra Tech 2003a).

Depth to groundwater in the BOU ranges from approximately 100 to 270 feet bgs (Tetra Tech 2003a). The alluvial basin-fill deposits in the eastern SFV lack laterally extensive geologic layers. However, the alluvium has been subdivided into "depth regions" consisting of discontinuous fine- and coarse-grained zones (CH2M HILL 1996). Region 1, younger alluvium, is present from approximately 200 to 280 feet bgs. It is in this region that many of the shallow remedial investigation monitoring wells and facility monitoring wells (i.e., sites under the jurisdiction of the RWQCB) are screened. Region 2, older alluvium, is present from approximately 270 to 420 feet bgs and has a high hydraulic conductivity. Most older production wells are screened in this region. Region 3 occurs from 400 to 700 feet bgs. Newer production wells, such as those in the Rinaldi-Toluca, Tujunga, and Western North Hollywood well fields, are screened in Region 3 (CH2M HILL 1998).

Region 1 has been further subdivided into five distinct hydrostratigraphic zones based on lithologic and geophysical logs and aquifer characteristics. From uppermost to lowermost, these hydrostratigraphic zones are characterized as the A', X, A, Y, and B zones. These zones appear to be laterally continuous; however, they vary in depth and thickness (Simon Hydro-Search 1993). Seven of the eight BOU extraction wells contain packers to focus extraction from the A' (where present) and A zones of Region 1. The packer in extraction well VO-8, a former municipal production well, is at the base of the B-zone, allowing groundwater extraction from both the A and B zones within Region 1. Generally, there is an upward gradient from the B zone to the A zone; however, a downward gradient has been measured immediately southwest of the BOU (Earth Tech 2000a). A hydrogeologic cross-section showing BOU extraction well construction is presented as Figure 3-4.

Differences in groundwater levels and differences in the degree of aquifer contamination implies that there is a separation between the A zone and the B zone. In addition, since groundwater levels are higher in the B zone compared to the A zone, this means that any groundwater movement between the aquifer zones would be upward into the more-contaminated A zone. However, future changes in the pattern and depth of pumping, could induce a downward hydraulic gradient. If this happens, contamination from the A zone could begin to move downward toward deeper aquifers. Based upon the regional groundwater model, the vertical hydraulic conductivity has been found to be about 100 times less than the horizontal hydraulic conductivity. This relatively low vertical hydraulic conductivity will impede, but not prevent vertical movement of contamination under the influence of a downward hydraulic gradient.

The regional groundwater flow direction in the BOU is southeasterly, towards the Los Angeles River Narrows, and is influenced by pumping at several well fields, and groundwater recharge at the Hansen, Branford, and Tujunga spreading grounds (CH2M HILL 1996). Generally, LADWP pumping from SFV well fields occurs during the summer months when demand for water is high. In the northwest portion of the BOU, groundwater flow direction is southeasterly, in accordance with the regional southeasterly trend. However, in the northeast portion of the BOU, the groundwater flow direction is southwesterly (Tetra Tech 2003a). Locally, groundwater flow directions can vary, influenced by pumping from the eight BOU extraction wells.

3.3 History of Contamination

In 1979, as a result of the passage of Assembly Bill 1803, the DHS requested that all major water providers sample and analyze groundwater for contamination as part of a statewide groundwater quality surveillance effort (EPA 1989). TCE was consistently detected in a large number of production wells in the SFV at concentrations greater than the MCL (EPA 2003b).

Solvents (TCE and PCE) were widely used from 1940 to 1967 for dry cleaning and degreasing machinery, and disposal of these solvents was not well-regulated. Numerous parties owned and operated facilities in the BOU Area, known to have used and sustained releases of solvents. Lockheed Martin, the primary responsible party for the BOU, owned and operated nine facilities within the current BOU area. Specifically, Plant B-1 (107 acres) operated from 1928 to 1990 in the BOU area as an aerospace and aircraft manufacturing facility. Fuel oils, gasoline, paints, primers, and chemicals including solvents, acids, caustics, and descalers were used at the facility. In December 1987, the Los Angeles RWQCB issued Cleanup and Abatement order No. 87-161 directing Lockheed to implement specific assessment and remediation tasks. Operations at Plant B-1 were discontinued in 1990, and the structures associated with it were demolished from 1990 to 1996. Upon removal of buildings, excavations were conducted to remove soil contaminated with chromium and other contaminants (Earth Tech 2002). In approximately 2002, the former Plant B-1 area was redeveloped for commercial use.

Source areas are addressed and managed by the RWQCB and their cleanup is not part of the selected remedy for Area 1. Therefore, the remedies for those source areas will not be evaluated in this document.

3.4 Initial Response

CERCLA was passed in 1980, the year that contamination was found to have impacted drinking-water supply wells in the SFV . As a result, the EPA provided federal funding for LADWP to conduct a two-year study to define the extent of contamination. The results of the study, published in 1983, revealed widespread VOC-contaminated groundwater in the SFV, specifically a contaminant plume migrating to the southeast at a rate of 300 feet per year.

In 1994, four SFV sites were proposed for inclusion on the NPL. In 1996, the four sites were placed on the final NPL. These are: Area 1 North Hollywood, comprised of the BOU and NHOU; Area 2 Glendale/Crystal Springs, comprised of the Glendale North and Glendale South OUs; Area 3 Verdugo, comprised of the Verdugo OU; and Area 4 Pollock Wellfield.

The City of Burbank shut down municipal production wells when the wells were found to contain VOC concentrations greater than respective MCLs. Water for the City of Burbank's municipal supply was purchased from MWD.

In October 1988, the BOU feasibility study was completed, which reported a maximum concentration of 1,800 µg/L of TCE and 590 µg/L of PCE in municipal well number 10 (inactive). A basin-wide remedial investigation was completed in 1992, and 87 groundwater monitoring wells were installed throughout the eastern SFV. To evaluate data on a regional scale, a basin-wide groundwater monitoring program was initiated and continues to date.

3.5 Basis for Taking Action

TCE and PCE were discovered in the groundwater in the BOU area at concentrations greater than the MCL. The VOC-impacted groundwater was a known drinking-water supply aquifer. As a result, the primary human health risk posed is the potential for direct ingestion of contaminated groundwater.

The results of the risk assessment were presented in the 1989 ROD. Only groundwater was considered since the source areas were, and are, managed by RWQCB. It was noted in the risk assessment that the aquifer was no longer being used as a public drinking water source after verification of TCE exceeding MCLs; therefore, there were no receptors. Assuming the wellfield was in use, use of the groundwater for a lifetime would present an unacceptably high cancer risk (EPA 1989).

TCE and PCE are constituents of concern (COCs) due to the potential risk from ingestion, dermal contact, and inhalation of volatilization fractions during showering or bathing. TCE and PCE are classified as probable human carcinogens, based on laboratory studies performed on animals.

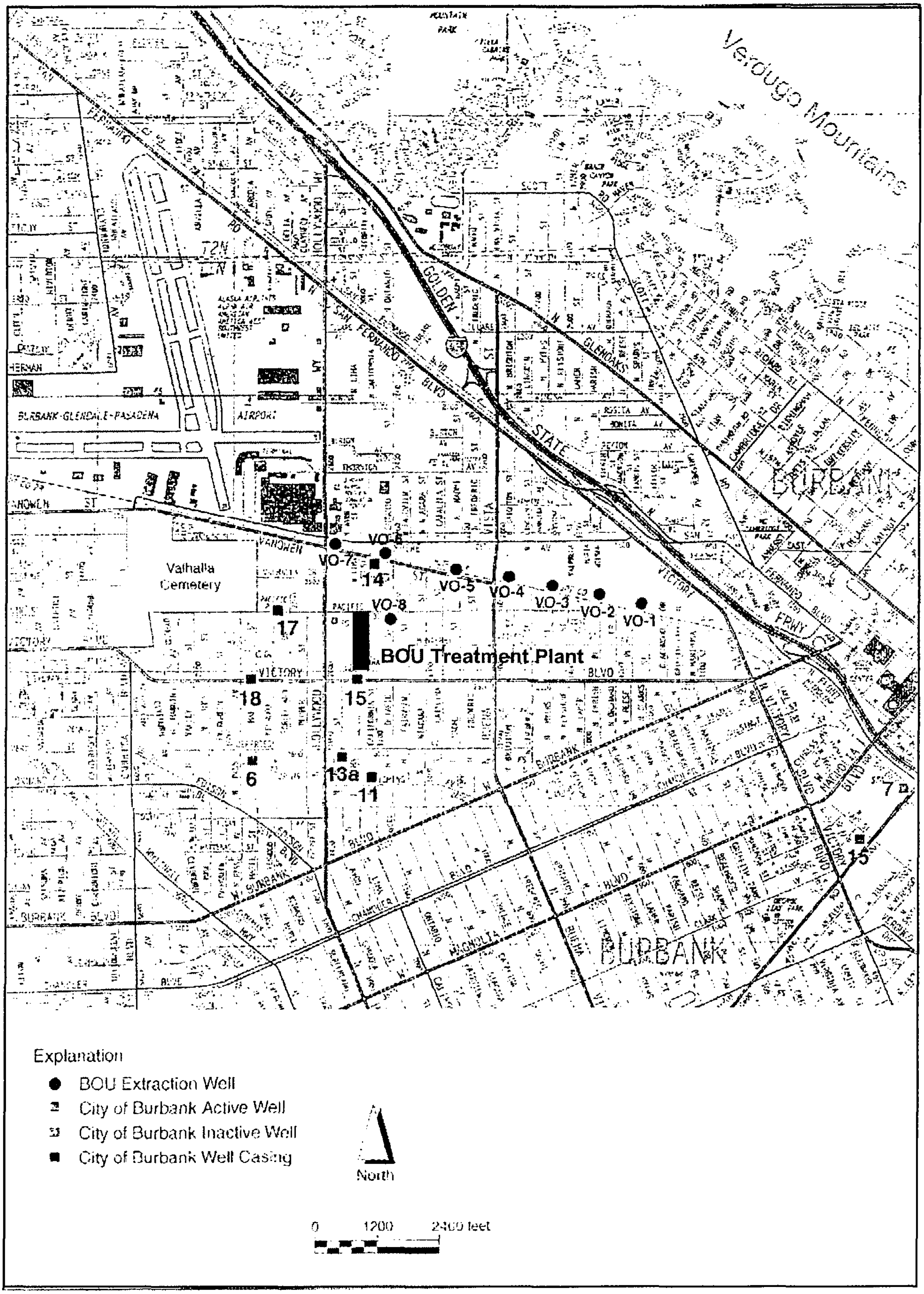


FIGURE 3-1
BOU EXTRACTION WELL LOCATIONS
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: Earthtech, 2000

CH2MHILL

316329 FR 01•BOU Extraction Wells Locations•9/9/04•ccc

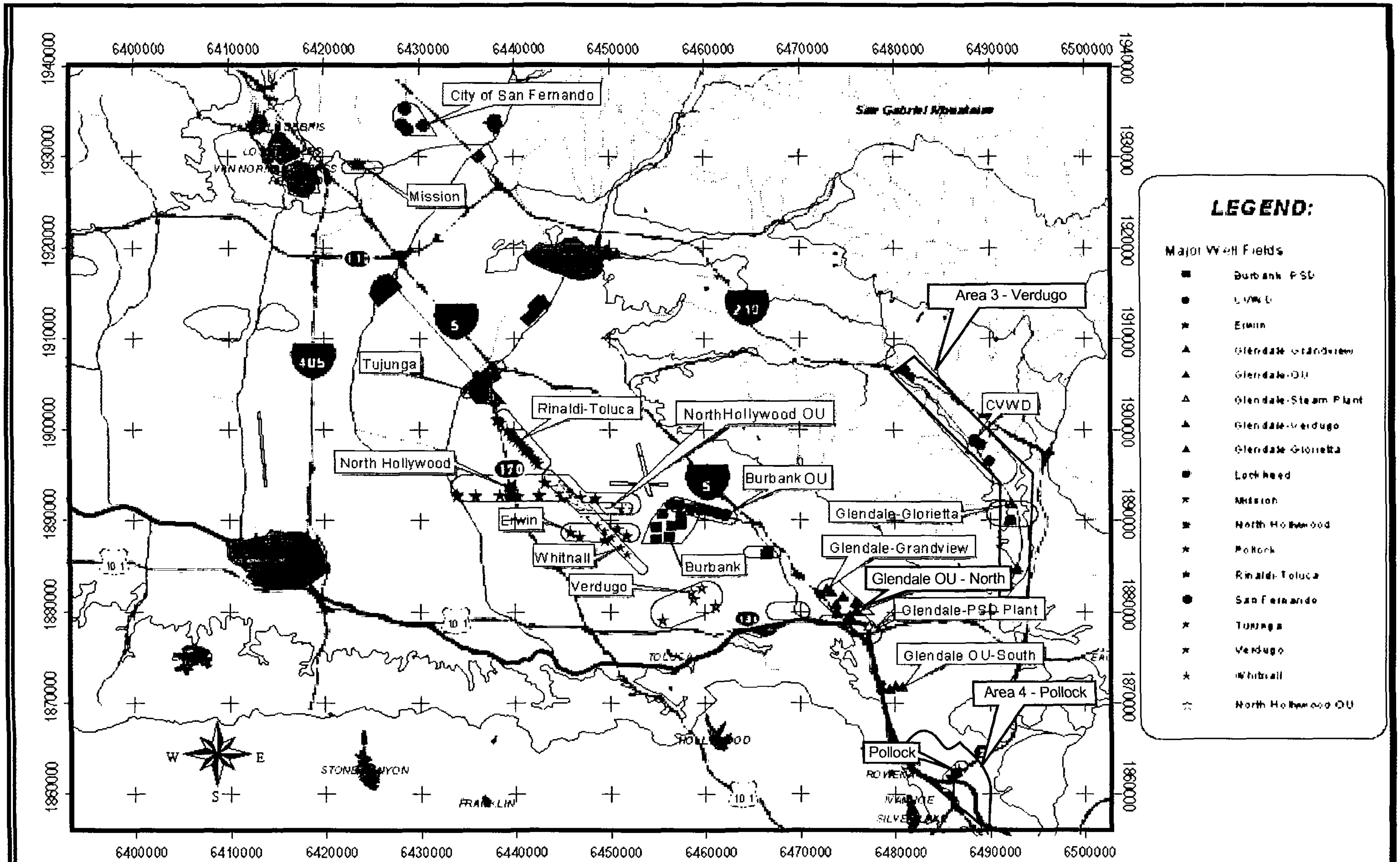


FIGURE 3-2
MAJOR PRODUCTION WELL FIELDS
UPPER LOS ANGELES RIVER AREA

SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: ULARA Watermaster Report, 2003b

316329 FR 01•Fig 3-2 Major Well Fields•9/27/04• ccc•SFO

CH2MHILL

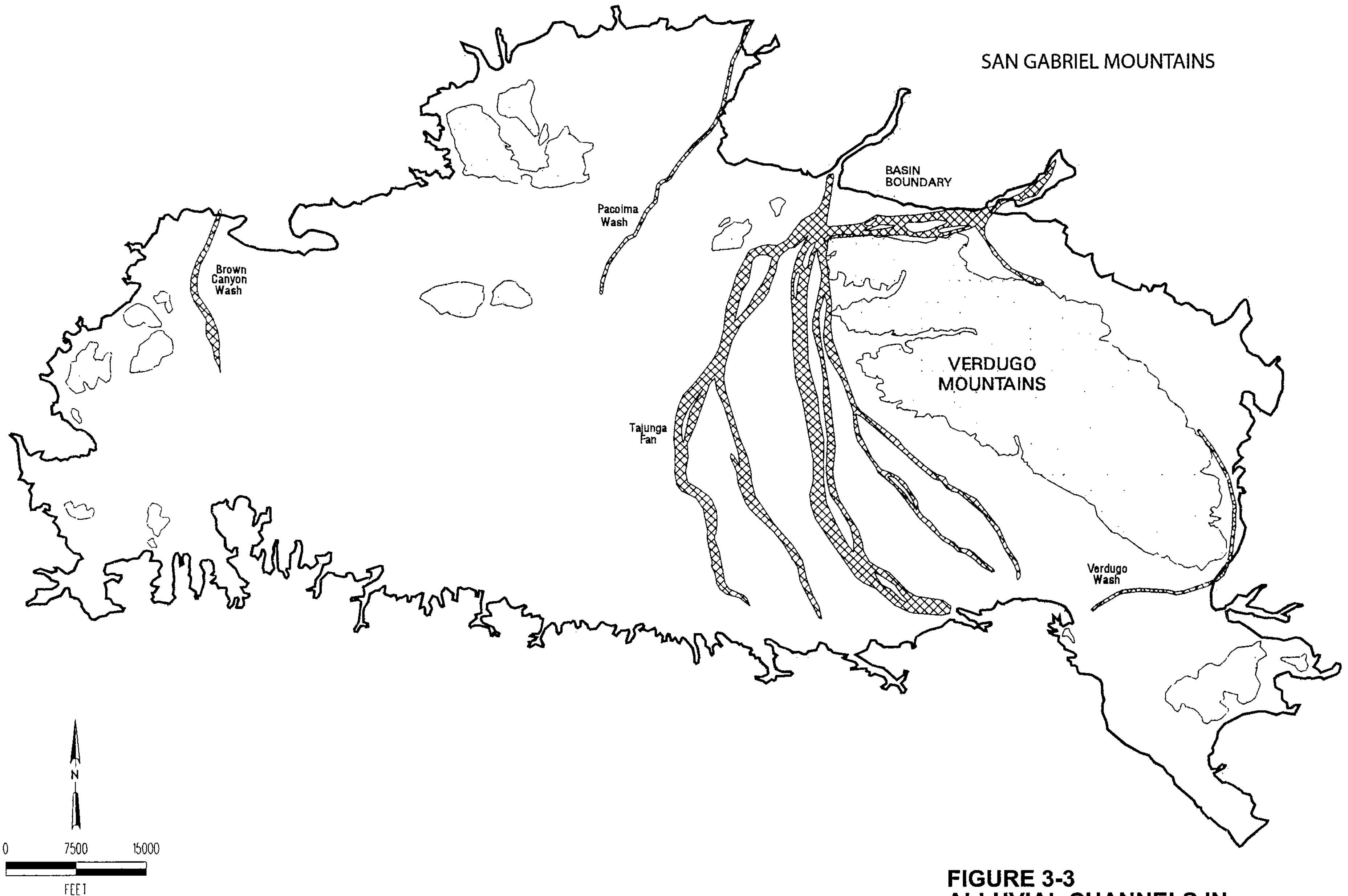
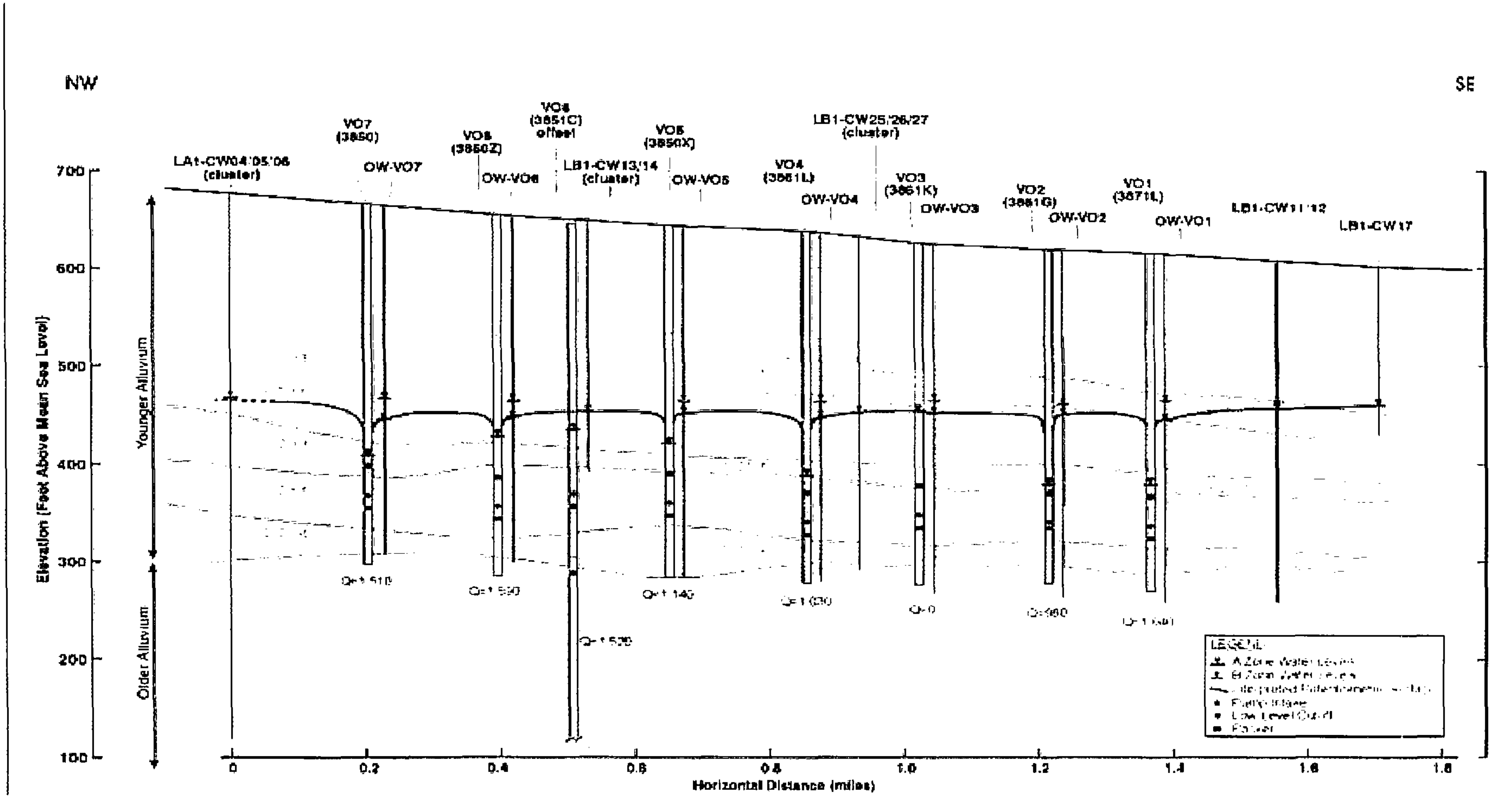


FIGURE 3-3
ALLUVIAL CHANNELS IN
SAN FERNANDO VALLEY, 1893
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: Report of Refree (SWRB, 1962)



Notes: 1) Pumping rates, Q (gallons per minute, 5-day average) measured between 07/27/01 and 7/31/01; water levels measured on 7/30/01 or closest preceding date.
2) Wells projected onto transect; distance between wells is approximate; distance between VO monitoring and pumping wells has been exaggerated.
3) Stratigraphic zones have been interpreted based on e-logs and Hargis & Associates 1992 A-A' cross-section.
4) Water levels presented are from 2001 9,000 gpm pump test.

FIGURE 3-4
HYDROGEOLOGIC CROSS SECTION ALONG BOU EXTRACTION WELLS
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: CH2M HILL, 2002 b

CH2MHILL

4.0 Remedial Actions

The following section summarizes the remedial actions selected and implemented at the BOU, as well as the historical O&M activities associated with the remedy since startup in 1996. The ROD for the BOU was signed in June 1989. The selected interim remedy addressed the VOC-contaminated groundwater plume in the Burbank area. An interim remedy was noted as such because it was to be implemented prior to completion of the basin-wide RI/FS. The objective of the interim remedy was VOC plume containment, VOC mass removal, and treatment of extracted groundwater to concentrations less than the respective MCLs.

The ROD selected groundwater extraction and treatment by air- or steam-stripping to reduce contaminant concentrations in treated groundwater to less than MCLs and SALs. Treated groundwater would be distributed by City of Burbank Public Services Department now Burbank Water and Power, for domestic use. The ROD stipulated that the treatment system would be designed to capture groundwater containing 100 µg/L of TCE or greater and 5 µg/L of PCE or greater. Additionally, the installation of vapor-phase granular activated carbon (VPGAC) to control VOC air emissions was necessary if air-stripping was used. The goal of the treatment system, as stated in the ROD, was to reduce the concentration of TCE and PCE to concentrations less than the MCL of 5 µg/L and SAL of 4 µg/L, respectively, in treatment system effluent. Installation of monitoring wells on the border of the contaminated plume was also required to monitor effectiveness of the extraction system (EPA 1989).

An ESD was signed in November 1990 to clarify certain aspects of the ROD. At the time of the ROD, the extent of nitrate contamination in the upper groundwater aquifer was not known. The ROD specified treatment to concentrations less than the MCL for all contaminants. An air-stripping treatment system for VOCs is not capable of remediating nitrate-contaminated groundwater. ESD #1 was issued to clarify that blending could be used to reduce the concentration of nitrates in extracted groundwater to less than the MCL of 45 milligrams per liter (mg/L). The nitrate blending requirement would increase the total amount of water produced from the treatment facility. The City of Burbank (the City) did not have the capability to accept additional water; therefore, EPA required reinjection of excess treated water back into the aquifer. ESD #1 also documented that the remedial action would be designed, constructed, and implemented in phases to allow for collection and evaluation of data to increase treatment plant efficiency and aquifer response. Phase I was to include design and construction of the treatment facility operating at 6,000 gpm. Phase II consisted of extraction and treatment of an additional 3,000 gpm of groundwater for use and/or reinjection. The third phase would include an additional 3,000 gpm of groundwater for use and/or reinjection. Lastly, EPA clarified in ESD #1 that the statements in the ROD pertaining to capturing groundwater with concentrations of 100 µg/L of TCE or greater and 5 µg/L of PCE or greater was not a statement of remedial action nor treatment goals; these were intended to be used in designing the containment area (EPA 1990). The estimated cost increase from ESD #1 was $8.8 million over 20 years (in 1990 dollars).

In March 1992, EPA entered into a Consent Decree with Lockheed Martin, the City of Burbank, and Weber Aircraft, Inc. The Consent Decree defined the remedial work to be performed, as stated in the ROD and ESD #1, identified quality assurance/quality control (QA/QC) protocol, and specified legal obligations and responsibilities. The Consent Decree stipulated that Lockheed Martin was to design and construct a 12,000-gpm groundwater extraction and treatment system that must meet MCLs and SALs, with the exception of nitrate. Furthermore, Lockheed Martin would operate the system for 2 years at Phase III, 12,000 gpm, capacity (United States District Court for the Central District of California 1992). The Consent Decree stated that the total amount of groundwater extracted by the BOU treatment system would be measured quantitatively by a pumping credit system.

In February 1997, ESD #2 was signed and eliminated the need for Phase III (additional 3,000 gpm) based upon the *Evaluation of Extraction Scenarios for the BOU* (Hydro-Search, Inc. 1995), which determined that an extraction rate of 9,000 gpm would result in the same level of plume containment and mass removal as 12,000 gpm. This eliminated the need for reinjection and decreased the likelihood that the A-zone would be dewatered, thereby allowing pumping to continue from the more contaminated upper aquifer. Due to the elimination of reinjection, the City would accept all treated water from the BOU. Because of maintenance requirements, the BOU groundwater extraction rate would not be a continuous 9,000 gpm but would be calculated as an average, as opposed to instantaneous (EPA 1997).

The City began operation of a 2,000 gpm LPGAC treatment plant in November 1992, known as the "Lake Street GAC." This facility extracted groundwater from former City production Wells No. 7 and No. 15 at startup. This system was normally operated only during the summer season from May to October; however, it is currently inactive due to concerns over chromium concentrations. The Lake Street GAC is not a part of the BOU remedy; however, ESD #2 allowed for credits to accrue from operation of the Lake Street GAC towards the overall BOU pumping credit system (ULARA 2002).

On June 23, 1998 a second Consent Decree was entered which provided for continued O&M by the City of the BOU treatment system for 18 years at 9,000 gpm. Funding was to be provided by a trust fund established and funded by Lockheed Martin and other parties to the Consent Decree. Furthermore, the second Consent Decree detailed performance of the work completed by the 1992 Unilateral Administrative Order 92-12 Parties and the possible dismantling or decommissioning of the facilities upon completion of the interim remedy. The second Consent Decree also modified the pumping credit system to account for the City's water demand and high nitrate days (greater than 45 mg/L combined influent) (United States District Court for the Central District of California 1998).

4.1 Remedial Action Implementation

Under the first Consent Decree, Lockheed Martin and the City of Burbank constructed Phase I of the BOU remedial action. The final remedial design report was approved by EPA in November 1993. Phase I of BOU treatment system construction occurred from 1993 to 1994 and included:

- Installation of seven extraction wells (VO-1 through VO-7) approximately 1,000 feet apart, capable of producing 6,000 gpm.

- Installation of monitoring wells within 30 feet of extraction wells.
- Design and construction of the groundwater treatment facility capable of treating 9,000 gpm.
- Conveyance piping from extraction wells to the treatment system.

ESD #1 stated that nitrate-contaminated groundwater would be treated by blending with water purchased from MWD to reduce the concentration to less than the MCL. This required construction of a blending facility. After disinfection of groundwater effluent water by the City, this water would be piped to the blending facility prior to distribution. Per UAO 92-12 and ESD #1, six PRPs funded construction of the blending facility, which was completed in July 1995. The blending facility was fully operational in December 1995. The facility is capable of blending up to 9,000 gpm of BOU treatment system effluent with a maximum blending facility capacity of 18,000 gpm.

The Phase II remedial action objective was to increase the groundwater extraction rate from 6,000 gpm to 9,000 gpm. To increase pumping rates, the City's municipal supply well W-10 (also known as WP-180) was modified to become BOU extraction well VO-8. This well was drilled in 1942 to 588 feet bgs (within groundwater Regions 1 and 2). In 1994, the well was refurbished and sealed with bentonite/cement to 354 feet bgs (within groundwater Region 1; HSI Geotrans 1997). A 12-inch-diameter transmission line to the BOU treatment facility was also constructed (Radian International 1997). The treatment system operated intermittently on limited production from January 1996 to June 1998 under the following DHS permits: Amendment 04-07-95PA-000 issued December 15, 1995 and a provisional permit to operate issued December 9, 1998. On January 22, 1998 a pre-final inspection was completed. In December 1998, Phase II construction of the BOU was completed. The BOU treatment plant satisfied the Phase I and Phase II requirements of the first Consent Decree and was capable of extracting and treating groundwater at 9,000 gpm.

4.1.1 Current Configuration of the Remedial Action

Figure 4-1 presents a schematic diagram of the BOU treatment system, and Figure 4-2 shows an aerial photograph. The current BOU treatment system components include:

Extraction Wells and Piping

- Eight extraction wells screened across multiple zones with packers, designed to extract a total of 9,000 gpm (see Table 4-1 and Figure 3-4).
- Conveyance (influent) pipeline from extraction wells to the treatment system.
- Conveyance effluent pipeline from the treatment system to the City of Burbank Forebay where treated water is stored, disinfected, and chlorinated.
- Conveyance pipeline from the City of Burbank Forebay to the blending facility to reduce the concentration of nitrate to less than the MCL (45 mg/L).

TABLE 4-1
Burbank Operable Unit Extraction Well Information
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Well Nos.	Location	Base Plate Elevation ft (msl)	Column Bottom Cap Depth ft (msl)	Low Water Cutoff Level ft (msl)	Water Level Sensor Depth ft (msl)	Pump Intake Depth ft (msl)	Depth to Top of Packer ft (msl)	Well Flow (gpm)	
								Min	Max
VO1	Southern Fenceline Plant B-1	608.435	335	241.5	247.6	271.5	282.5	650	1,500
VO2	Southern Fenceline Plant B-1	612.665	332	241.6	248.5	271.6	282.5	650	1,500
VO3	Southern Fenceline Plant B-1	619.01	338	241.6	257.3	271.3	282.3	650	1,500
VO4	Southern Fenceline Plant B-1	631.01	356	260.5	269.6	290.4	301.4	650	1,500
VO5	Vanowen Street	637.03	350	247	250.2	277	287.9	850	1,900
VO6	Vanowen Street	647.9	359	261.4	382.7	291.4	302.1	850	1,900
VO7	Vanowen Street	660.7	365	262.8	267.3	292.8	303.8	850	1,900
VO8	Fire Training Center	646.6	354*	275	258	288	354*	600	1,500

Note:
* enviroplug (cement plug).
Well flow minimum based on O&M min. set point; maximum flow based on equipment design point.
ft msl: feet above mean sea level
gpm: gallons per minute

Treatment System

- Two 14-foot-diameter, 59-foot-high air-stripping towers filled (40 feet) with packing material; each capable of 4,500 gpm capacity (Earth Tech 2000).
  - Three 75 horsepower air blowers (one backup) and effluent pumps.
  - Chemical storage and feed facility for CL-50 (anti-scalent).
- Six 14-foot-diameter VPGAC units, each containing 24,000 pounds of VPGAC. Two trains comprised of three units in series (two backup units). Thirty-foot-high emission stacks (City of Burbank 2003).

  - Two dehumidifier heaters (one per train).

- Six 14-foot-diameter, 40-foot-tall LPGAC towers (divided into two trains with two backup towers); each tower contains two LPGAC beds, each holding 42,000 pounds of carbon.
- Steam regeneration system for VPGAC (and formerly LPGAC).
- Two 5,000-pound LPGAC in series for GAC regeneration condensate (constructed in 1999).
- Six chemical storage tanks (Table 4-2).

TABLE 4-2
Burbank Operable Unit Aboveground Storage Tank Information
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Tank	Capacity (gallons)	Storage material	Current Status
600	20,600	condensate from regeneration	in use
610	3,008	solvent recovery tank	in use
770	18,400	backwash tank	not in use
780	30,300	LPGAC bed regeneration	not in use
790	30,300	LPGAC storage silo	not in use
920	21,000	utility water tank	in use

Per the second ESD, the required rate of groundwater extraction is 9,000 gpm on average. Extraction well pumping rates are dependent upon the DHS permit stipulation of flow balancing to control the influent concentration of chromium, when applicable. A single pipeline conveys the extracted groundwater to the BOU treatment system where an anti-scalent (CL-50) is added to minimize scaling of the packing material in the tower. Influent enters the top of one of the two air stripper treatment trains. A countercurrent flow of air is introduced as the water flows over the packing material. Once VOCs vaporize to the air stream, the air stream is heated to reduce its relative humidity and then passes through two parallel VPGAC units where VOCs are adsorbed prior to releasing the air to the atmosphere. Treated groundwater (effluent) is conveyed to one of two LPGAC polishing trains. Each LPGAC train consists of three towers in parallel (one on standby), each containing two LPGAC beds of 42,000-pound carbon. The treated groundwater is then discharged to the City of Burbank Valley Forebay for disinfection and storage, then to the blending facility. Here, the groundwater is blended with water from MWD to decrease the nitrate concentration per ESD #1 and #2, prior to distribution to consumers (AWD Technologies 1993). Originally design allowed for onsite regeneration of VPGAC and LPGAC. Due to the cost and operations problems, LPGAC onsite regeneration ceased some time around 1998. VPGAC continues to be regenerated onsite approximately every 30 days (10 days as polishing lag vessel, 10 days as lead vessel, followed by 10 days in regeneration/stand-by). The maximum runtime for a LPGAC vessel is 200 days, as per the 1,2,3-TCP monitoring plan.

4.1.2 Historical Performance of the Remedial Action

Phase I of the BOU remedial action began extracting and treating groundwater to MCLs in January 1996 for distribution by the City. This section details historical operational problems that have arisen influencing performance of the remedial action and corrective actions implemented to resolve the problems where applicable.

4.1.2.1 Carbon Fines in the City Forebay

On September 19, 1996, at the request of the City, the BOU treatment facility was shut down due to residents complaining of off-color water and carbon fines found in the City's Forebay Reservoir. An investigation determined the following with respect to LPGAC:

1. The carbon flush procedure did not adequately flush carbon beds prior to placing them online and did not meet EPA guidelines.
2. Biofouling, design, operator error, valves, and effluent screens did not contribute to the problem.
3. Calcium carbonate may have caused channeling within the LPGAC prior to carbon bed changeout.
4. Carbon samples from the Forebay were less than 300 microns in size, indicating only fines escaped the treatment facility.

The November 1996 *Liquid Phase Granular Activated Carbon Fines Study* (Radian International 1996) recommended:

1. Revise carbon flushing procedures in accordance with EPA guidelines.
2. Prior to loading purchased carbon from a supplier, test to ensure the fine content and specification are in compliance
3. Determine cause and remedy for calcium carbonate fouling of LPGAC beds.

Operation of the BOU treatment plant recommenced on November 18, 1996. Monitoring of the plant effluent for color and turbidity was performed in accordance with the frequency requested by EPA, and a particle counter was ordered for the facility. The O&M manual, Section VII, was revised to reflect changes in carbon flushing procedures.

4.1.2.2 Tank-600

A review of Phase II operation diagrams by DHS showed that separated waste stored in Tank-600 was being introduced to the head of the treatment plant (air-stripping towers) for treatment and disposal. Tank-600 received waste from multiple sources. The primary concern was the large volume of condensate water produced during VPGAC and LPGAC carbon regeneration (containing VOCs) in violation of State potable water standards (CH2M HILL 2002a). Putting waste into the initial treatment stage of a drinking water treatment facility posed a possible threat for circular contamination of other unknown contaminants. While treated water entering the LPGAC units was consistently below the MCLs, DHS did not believe that the current VPGAC/LPGAC BOU treatment system was a long-term solution for Tank-600 waste.

At the request of DHS, the facility was shut down from December 11, 1997 to June 11, 1998 while an investigation into Tank-600 waste was planned. Under a temporary approval letter from EPA dated June 9, 1998 the treatment system was restarted on June 12, 1998. The system was shut down June 18, 1998 when VOC concentrations from Tank-600 were in excess of concentrations allowed in the temporary approval letter. Lockheed Martin submitted an Interim Operations Plan (IOP) on November 16, 1998 to DHS. The treatment facility continued to operate at limited capacity (less than 700 gpm on average), discharging the effluent that met MCLs to the storm drain. The treatment system did not provide treated water to the City from December 15, 1997 to December 12, 1998. Under the IOP, the facility was restarted on December 12, 1998, delivering water to the City. The delay was primarily due to negotiations with DHS regarding a permit. The facility operated under the IOP until August 1999. Under the IOP, the influent to Tank-600 was restricted and extensive sampling of Tank-600 effluent and all parts of the treatment process was performed. Additionally, restrictions were placed on air stripper towers one and two effluent, flow rates were restricted, and all wells were extracted from in equal amounts.

Data collected under the IOP showed concentrations of TCE and PCE up to 250 mg/L and 92 mg/L, respectively, from Tank-600 effluent. In February 1999, a *Tank-600 Treatment Alternative Analyses* was performed (Earth Tech 1999). EPA and DHS agreed that Tank-600 waste should be treated by a separate system: two 5,000-pound LPGAC units in parallel discharging to the storm drain under the September 2, 1998 National Pollutant Discharge Elimination System (NPDES) permit. The LPGAC would be regenerated off-site. Modifications to the Tank-600 system were completed August 23, 1999 and the treatment system was restarted under normal operations.

4.1.2.3 TCE and PCE in Plant Effluent

On March 12, 1999, results were received from routine plant effluent sampling performed under the DHS permit on March 11, 1999. TCE and PCE concentrations of 1.9 µg/L and 1.0 µg/L respectively were detected in plant effluent samples. These results are less than the permitted MCLs; however, as a precaution, the system was shut down over the weekend while the results of LPGAC bed sampling were analyzed. Laboratory analytical results were not reported above the detection limit. As a precaution, resampling was conducted for laboratory analyses and analyses using the on-site gas chromatograph. Field results from the on-site gas chromatograph showed contaminant levels in samples from LPGAC bed AD730A upper. Resampling for laboratory analyses yielded results of 12 µg/L TCE and 4.8 µg/L PCE.

LPGAC bed AD730A was taken offline and the system was restarted using the backup LPGAC bed. An investigation determined that the regeneration process was incomplete, as only two-thirds of the steam required was used (Lockheed Martin 1999a). Additionally, the bed was not sampled for VOCs prior to being placed back in service as Standard Operating Procedure dictated. The bed had only been in service for three days prior to shutdown. Secondary contributing factors included carbon fines in the water stored in Tank-770 and the water used for carbon regeneration. Additionally, the process vent was under positive pressure to relieve the pressure from vessels, which could facilitate movement of VOCs in the headspace of the tanks. The following corrective actions were taken:

1. Service boilers.
2. Calibrate steam flow meter.
3. Use of off-site regenerated carbon until items #1 and #2 completed.
4. Regenerate all LPGAC on-site.

4.1.2.4 Transfer of O&M Responsibility to the City and the '*Force Majeure*' Claim

Following completion of Phase II construction, the second Consent Decree planned for O&M responsibilities of the BOU to transfer to the City after two years of operating. Phase II startup was December 1998, with a transfer date planned of December 2000. This transfer was delayed to March 12, 2001 because of outstanding maintenance issues.

In October 2001, Lockheed Martin filed a *force majeure* claim under a provision of the Second Consent Decree, stating that the aquifer beneath the BOU was not capable of sustaining an average pumping rate of 9,000 gpm. In May 2002, EPA provided Lockheed Martin written notice that it was out of compliance with the requirement to produce 9,000 gpm from June 13, 2000 to July 2, 2001. An evaluation of the aquifer's ability to sustain 9,000 gpm was performed by EPA in the form of an aquifer test. The aquifer test revealed that the aquifer was capable of meeting the pumping requirements, therefore EPA denied the *force majeure* claim. EPA determined that the cause of reduced pumping was primarily due to flawed design and inadequate maintenance of equipment (CH2M HILL 2002a). Specifically, VPGAC screen failure, LPGAC design issues, and extraction well pump and controls related problems primarily contributed to the inability to meet the 9,000 gpm goal. These issues and the plans for addressing them are discussed below.

4.1.2.5 LPGAC Design

The original EPA-approved LPGAC design was downflow of water through the vessels. During Phase I construction, Lockheed Martin changed the LPGAC configuration from downflow to upflow to reduce complications of lever controller tuning without EPA approval. In July 1997; after operational problems, were noted, EPA requested that Lockheed Martin change the configuration from upflow to downflow to bring the system into conformance with standard design practices. This change was incorporated into the Phase II activities.

In April 2001, at the request of EPA, United Water measured the locations of the sampling port taps within Vessel 750A during change-out of the LPGAC. Four ¼-port sampling taps were significantly out of line with the actual ¼ bed levels. An operator stated that the sampling taps were intentionally bent to new positions when the LPGAC vessels were converted to the downflow mode (rationale undetermined) (CH2M HILL 2001). CH2M HILL, on behalf of EPA, inspected the LPGAC vessels and internal components in February 2002, after concerns were raised over the positions of the ¼-port sampling taps and internal plumbing. CH2M HILL found that the LPGAC may not backwash correctly due to screens and internal design, allowing carbon fines and sand to accumulate (CH2M HILL 2002c).

On December 23, 2003 EPA approved the *100% Design Submittal for LPGAC Retrofit for the BOU* (United Water 2003). The LPGAC modifications were completed in January 2004, which included removal of screens, and new distribution and sample collection internals.

Additional tasks to address current LPGAC related issues have been identified and will be implemented in 2004 – 2005. These include:

- a performance attainment study of hydraulic capacity and well field mechanics;
- an evaluation of pressure drop issues;
- an evaluation of carbon fines accumulation;
- an evaluation of premature 1,2,3-TCP breakthrough; and
- an evaluation of backwash procedures.

4.1.2.6 VPGAC Screen Failure

In 1998, it was first noted that a loss of production was being caused by VPGAC screen failure. The inner cylinder of multiple vessels had failed, which is an ongoing operations problem requiring maintenance. During the VPGAC screen failure, dust is generated and emitted through the stack. Temporary repairs were made by welding plates over the failed screen area, possibly influencing flow (CH2M HILL 2001b). In February 2001, a study was performed and a metallurgist assessed the VPGAC screens. This study recommended fundamental changes to the VPGAC vessel flow direction, process changes, and screen metallurgy to improve the life of the carbon and decrease down-time due to screen problems (CH2M HILL 2003a; Earth Tech 2001). In June 2004, EPA received the VPGAC screen design; a 100 percent design for the VPGAC units as a whole will be submitted in the near future, with the VPGAC modifications planned for late 2004/early 2005.

4.2 Operation and Maintenance

O&M of the treatment system is necessary to achieve the objectives set forth in the ROD, ESD #1, and ESD #2: containment of VOC-contaminated groundwater in the Burbank area, mass removal of VOCs, and treatment of captured groundwater to concentrations less than MCLs and SALs, with the exception of nitrate. Specifically, appropriate and efficient O&M maximizes the operational time of extraction wells and the treatment plant to meet the extraction rate objective of 9,000 gpm. O&M includes preventative and required maintenance, permit requirements, and Consent Decree mandated activities. The main four areas of achievement of the treatment system that require O&M are: extraction wells, air stripper and VPGAC, LPGAC, and the blending facility.

There have been many changes to the configuration of the BOU over the years, as discussed in Sections 4.1.1 and 6.3.3. Similarly, the O&M manual has evolved. EPA approved the O&M manual in 1994 (Hydrosearch) *Final Phase I Operations and Maintenance Plan, Extraction Wellfield BOU*. Subsequent to Phase II modifications, two revised Operations and Maintenance Plans were submitted in 1997. These were the – *Extraction Wellfield BOU* and *Final Phase Operations and Maintenance Plan for Treatment Plant and Pipeline Construction* submitted in 1997 (Radian 1997; HSI Geotrans 1997). Most recently the *Operations and Maintenance Plan for the Burbank Operable Unit* was drafted in June 2000 (United Water). Given the changes to the treatment system, for the purposes of documenting and evaluating routine O&M tasks, the most recent unapproved O&M manual was evaluated as a part of this five-year review.

Under CERCLA (40 United States Code of Federal Regulations [CFR], Section 121), the BOU treatment facility is exempt from permits and the permit "equivalency" process for activities that are entirely onsite; however, the BOU is required to comply with the substantive requirements of applicable or relevant and appropriate requirements (ARARs), as described in Section 6.4. Federal, state, and local permit requirements that are relevant to the BOU include DHS operating permit, NPDES discharge permit, and South Coast Air Quality Management District (SCAQMD) air emissions permit.

The city of Burbank has obtained a DHS permit to deliver the treated groundwater to its customers. The DHS operating permit for the treatment system requires treated water for domestic supply from the blend point to have COC concentrations of less than the MCLs and/or DHS Alternate Concentration Limits. The DHS permit has been amended multiple times since treatment plant startup, with the most recent being water permit amendment No. 04-07-00PA-000, dated October 2000. A summary of permit conditions follows:

- Treatment facility operations (approved domestic water sources by wells VO-1 through VO-8).
- Water quality sampling, monthly reporting requirements (by the 20th of each month), and lab certification requirements.
- Extraction well field (DHS approved *VO-1 Chromium Blending Plan* (May 13, 1999) control pumping rates from chromium impacted wells to ensure plant effluent is less than the State MCL.
- Treatment plant (addition of antiscalent (CL-50), VPGAC and LPGAC to remove VOCs, no waste recycling to the head of the BOU treatment plant, daily inspections).
- Valley pumping plant (point of chloramination).
- Blending facilities (nitrate blending). Water leaving the blending facility must comply with SALs and MCLs for all constituents.
- General provisions.
- *1,2,3-TCP Monitoring Plan* (July 14, 2000)

The BOU treatment facility has been operating under RWQCB waste discharge requirements since October 1998 for discharge of treated Tank 600 water to the storm drain. Treated water primarily includes effluent from the second treatment facility for Tank-600 waste, and to a lesser extent, may comprise effluent from the treatment plant, boiler blowdown water, and stormwater. Routine monitoring is performed in accordance with NPDES guidelines.

On May 10, 2000, on behalf of Lockheed Martin, Earth Tech submitted a package to EPA using requirements mandated by the SCAQMD to evaluate anticipated air emissions. The application package fulfilled the permit equivalency process for CERCLA and requirements under the Clean Air Act. Air emissions sampling from VPGAC emission stacks A and B is performed quarterly. Laboratory analytical results have been presented regularly in monthly reports submitted to EPA since October 2003 and are evaluated internally by the BOU treatment plant operator (currently United Water for the City of Burbank).

Monthly progress reports are submitted to EPA in accordance with Section XI (reporting requirement) A, Appendix V Section II, B3 of the second Consent Decree by the BOU treatment plant operator (currently United Water for the City of Burbank). In general, these progress reports summarize system operations and maintenance activities and limited sampling results for the month. Semi-annual groundwater monitoring and sampling reports are submitted to EPA by Lockheed Martin, as per the second Consent Decree.

Table 4-3 summarizes routine preventative maintenance for the BOU treatment system. In addition to items listed, VPGAC is regenerated every 10 days per treatment train (each vessel every 30 days) on site. LPGAC is regenerated off site; when there is a detection of 1,2,3-trichloropropane (1,2,3-TCP) at the ¾ port, the vessel is shut down. Status of routine maintenance and GAC change-out is provided in monthly reports.

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
Carbon Transfer Booster Pump	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Inspect motor starter & associated control devices	Semi-Annually
	4) Perform vibration analysis	Annual
	5) Perform infrared inspection	Annual
	6) Rebuild per O&M manual	5 years
Air Stripper Blower	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Inspect motor starter & associated control devices	Semi-Annually
	4) Inspect belts and pulleys	Monthly
	5) Perform vibration analysis	Annually
	6) Perform infrared inspection	Annually
	7) Rebuild per O&M manual	5 years
Instrument Air Compressor	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Inspect motor starter & associated control devices	Semi-Annually
	4) Perform vibration analysis	Annually
	5) Perform infrared inspection	Annually
	6) Rebuild per O&M manual	5 years
Extraction Well Pump	1) Visually inspect equipment and clean accordingly	Monthly

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
	2) Lubricate equipment per O&M manual.	Annually
	3) Inspect motor starter & associated control devices	Annually
	4) Perform cathodic protection check	Monthly
	5) Perform vibration analysis	Annually
	6) Perform infrared inspection	Annually
	7) Rebuild per O&M manual	7 Years
Boiler Flue Gas Fan	1) Visually inspect equipment and clean accordingly.	Monthly
	2) Lubricate equipment per O&M manual	Annually
	3) Inspect motor starter & associated control devices	Annually
	4) Perform cathodic protection check	Monthly
	5) Perform vibration analysis	Annually
	6) Rebuild per O&M manual	5 years
Boiler Feed Pump	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Annually
	3) Inspect motor starter & associated control devices	Annually
	4) Perform vibration analysis	Annually
	5) Perform infrared inspection	Annually
	6) Rebuild per O&M manual	5 years
Steam Superheater	1) Visually inspect equipment and clean accordingly	Monthly
	2) Rebuild per O&M manual	5 years
Discharge Pump	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Inspect motor starter & associated control devices	Semi-Annually
	4) Perform vibration analysis	Annually
	5) Perform infrared inspection	Annually
	6) Rebuild per O&M manual	5 years
Air Relief Valve	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
	3) Rebuild per O&M manual	5 years
Vent with Bug Screen	1) Visually inspect equipment and clean accordingly	Quarterly

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
	2) Perform operational check per O&M Manual	Annually
	3) Rebuild per O&M manual	5 years
Basket Strainer	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
	3) Rebuild per O&M manual	5 years
Steam Trap	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
	3) Rebuild per O&M manual	5 years
Cone Strainer	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
	3) Rebuild per O&M manual	5 years
Sight Flow Indicator	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
Jet Nozzle	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
Eyewash Shower	1) Visually inspect equipment and clean accordingly	Weekly
	2) Perform operational check per O&M Manual	Weekly
	3) Rebuild per O&M manual	5 years
Backflow Preventor	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform operational check per O&M Manual	Annually
pH Analyzer	1) Visually inspect equipment and clean accordingly	Weekly
	2) Perform calibration check per O&M Manual	Bi-weekly
	3) Perform full analyzer calibration	Semi-Annually
Gauge Glasses	1) Visually inspect gauge and clean accordingly	Weekly
Motor-Operated Control Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Inspect motor starter & associated control devices	Quarterly
	4) Rebuild per O&M manual	5 years
Well Level Switch	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
Sump Level Switch	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
RTD Assembly	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform calibration check per O&M Manual	Quarterly
	3) Perform full analyzer calibration	Semi-Annually
Ultrasonic Level Switch	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full analyzer calibration	Annually
Magnetic Flowmeter	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full analyzer calibration	Annually
Automatic / Semi-Automatic Ball Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Automatic Butterfly Block Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Orafice Plate and Flange	1) Visually inspect equipment and clean accordingly	Annually
Pilot Tubes	1) Visually inspect equipment and clean accordingly	Annually
Pressure Safety Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Solenoid Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Pressure Switch	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
Capacitance Level Switch	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
Vacuum Safety Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Pressure Regulator	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
Ball-type Control	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Globe Style Control Valve	1) Visually inspect equipment and clean accordingly	Monthly
	2) Lubricate equipment per O&M manual	Quarterly
	3) Rebuild per O&M manual	5 years
Pressure Gauge	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
I/P Transducer	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually
Transmitter	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually
Capacitance Level	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually
Current Converter	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually
Well Switch	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
DP Gauges	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform operational check per O&M Manual	Semi-annually
Thermometer	1) Visually inspect equipment and clean accordingly	Semi-annually

TABLE 4-3
Burbank Operable Unit Preventative Maintenance
Burbank Operable Unit, San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency
	2) Perform calibration check per O&M Manual	Semi-annually
RTD Temperature Transmitter	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform calibration check per O&M Manual	Semi-annually
	3) Perform full sensor calibration	Annually
Air-Operated Backwash Transfer Pump	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform performance test per O&M manual	Semi-annually
Steam Condenser	1) Visually inspect equipment and clean accordingly	Quarterly
	2) Perform infrared inspection	Annually
HCl Influent Water Static Mixer	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform performance test per O&M manual	Annually
Hydroclone Separator	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform performance test per O&M manual	Annually
Auto-backwash Filter	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform performance test per O&M manual	Annually
Fluid-Operated Spent Carbon Transfer Jet Pump	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform performance test per O&M manual	Annually
Fluid-Operated Virgin Carbon Transfer Jet Pump	1) Visually inspect equipment and clean accordingly	Semi-annually
	2) Perform performance test per O&M manual	Annually

4.2.1 Operations and Maintenance Costs, 1991 to 2004

The second ESD estimated the BOU treatment system O&M costs in 1996 over 20 years to be $93 million net present value. Documents reviewed during this five-year review did not yield a valid comparison of the 1996 estimated O&M budgets versus the actual cost incurred since startup. The actual costs and budget forecast for the period of 1991 to 2004 are presented in Table 4-4.

The 2001 approved budget did not include costs for the potential impacts of 1,2,3-TCP fouling, the impact of chromium, nor carbon consumption. However, 26 percent of the total laboratory budget of that year was allocated to the analyses of 1,2,3-TCP and 9 percent was allocated to chromium, respectively.

In 2003, Tetra Tech, on behalf of Lockheed Martin, performed an assessment of the overall BOU operations cost to address efficiencies and reduce O&M costs. The report identified power as the highest-cost item of that budget year (42.1 percent of total budget) followed by labor (16.9 percent) and LPGAC (15.9 percent). Technical changes were recommended in order to diminish power costs. An analysis of the labor costs were provided in the report; however, no recommendations were made. In terms of LPGAC costs, the assessment recommended keeping the current boiler, as replacing it with a lower capacity boiler was not economical (Tetra Tech 2003b). The assessment included cost estimates for implementation of operational recommendations for the BOU.

The 2004 budget included funding for VPGAC modifications and repairs to the pump from extraction well VO-5. The VPGAC system comprised 65 percent of the total capital improvements budgets of that year. The 2004 budget noted O&M trust account overfunding due to budget underruns in the previous budget year.

Based on the documents reviewed, since startup, power has consistently been the highest budget item followed intermittently by LPGAC and direct labor.

TABLE 4-4
Burbank Operable Unit Groundwater Treatment System Operations and Maintenance Costs, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Year and Description	Total Cost or Projected Cost	Additional O&M Activities
1991 Actual Costs[c]	$600,000	
1992 Actual Costs[c]	$800,000	
1993 Actual Costs[c]	$800,000	
1994 Actual Costs[c]	$1,000,000	
1995 Actual Costs[c]	$700,000	
1996 Actual Costs[c]	$3,000,000	Carbon fines in the City Forebay
1997 Actual Costs[c]	$3,000,000	LPGAC configuration change from upflow to downflow
1998 Actual Costs[c]	$1,693,000	VPGAC screen failure first occurred.
1999 Actual Costs[c]	$2,724,000	Tank 600: $350,000 construction; First year O&M $71,900; Subsequent years O&M $37,500
2000 Budget[d]	$2,542,000	Transfer of operational responsibility from Lockheed Martin's contractor to the City
2001 Budget[a,e]	$3,283,200	
2002 Budget[f]	$5,485,000	
2003 Budget[g]	$5,195,000	LPGAC upgrades, Efficiency Study
2004 Budget[b, h]	$6,600,000	VPGAC upgrades

TABLE 4-4
Burbank Operable Unit Groundwater Treatment System Operations and Maintenance Costs, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Year and Description	Total Cost or Projected Cost	Additional O&M Activities

Notes:

All costs are rounded to the nearest thousand dollars.

[a] Pro-rated from 03/12/01 through 12/11/01.

[b] Effective from 13 December 2003 through 12 December 2004.

[c] Provided by Lockheed Martin.

[d] Provided by Earth Tech – August 17, 2000c *Backup for Annual Operations and Maintenance Budget at the Burbank OU Water Treatment Plant.*

[e] Provided by Kennedy/Jenks Consultants - March 2, 2001 O&M Budget.

[f] Provided by Kennedy/Jenks Consultants - September 17, 2001 Proposed 2002 O&M Budgets.

[g] Provided by Tetra Tech Inc (August 7, 2003) *Technical Operational Assessment of Burbank OU Ground Water Treatment Facility.*

[h] Provided by Kennedy/Jenks Consultants December 15, 2003 O&M Budget.

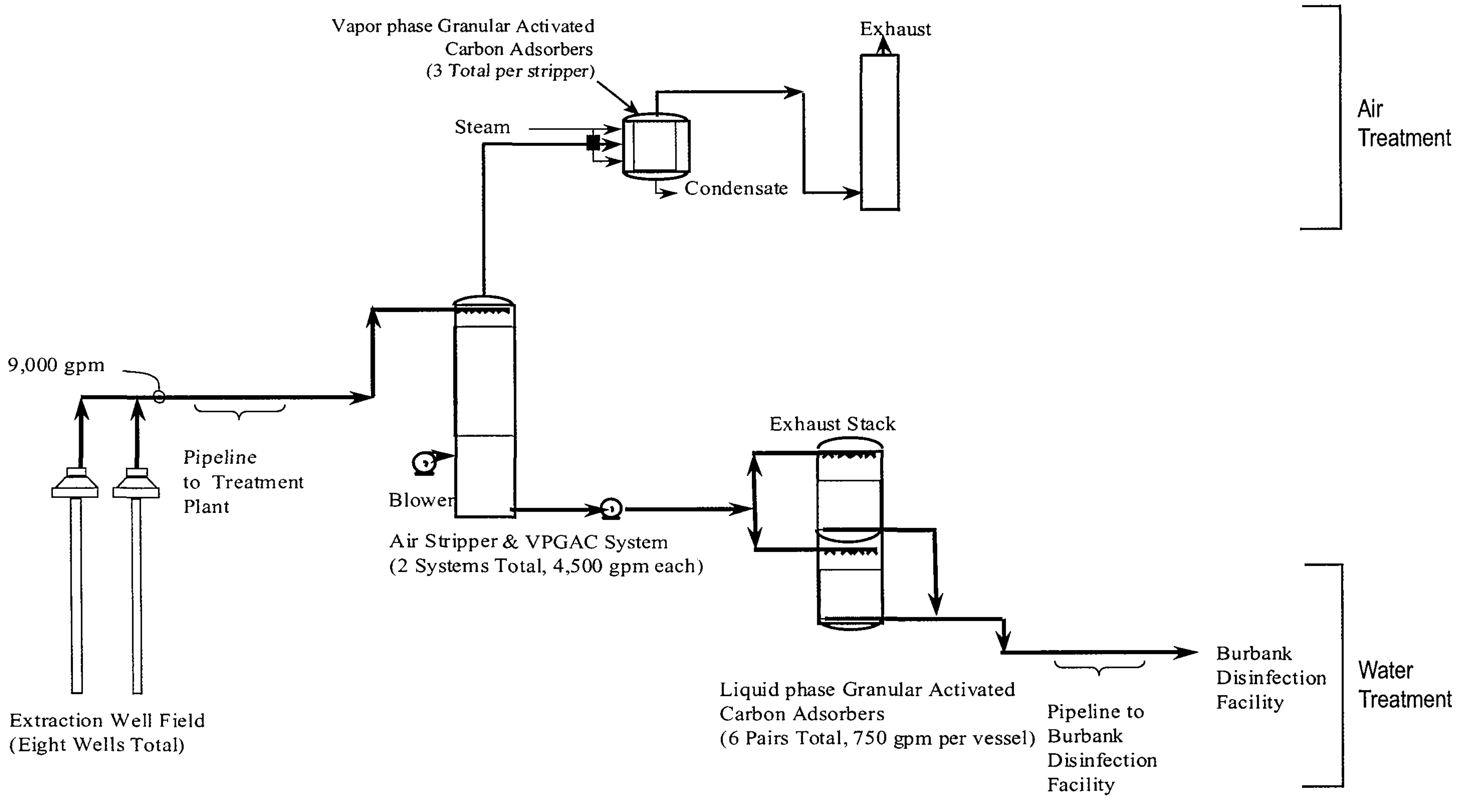


FIGURE 4-1
SCHEMATIC DIAGRAM OF BOU GROUNDWATER TREATMENT FACILITY
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: CH2M HILL, 2002 b

CH2MHILL

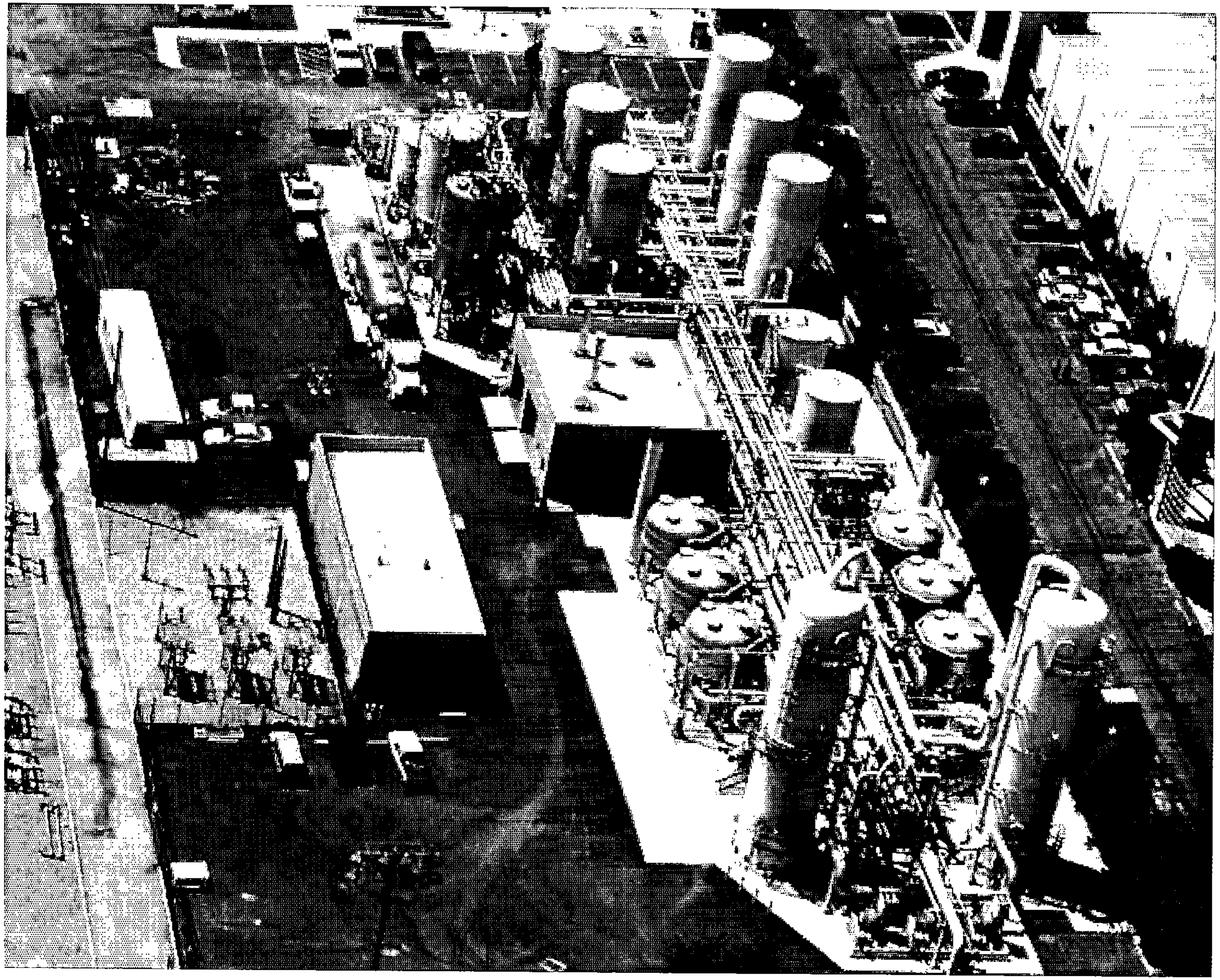


FIGURE 4-2
AERIAL PHOTOGRAPH OF THE
BOU GROUNDWATER TREATMENT FACILITY
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

5.0 Progress Since the Last Review

This is the first five-year review for the BOU. In 2009, a comprehensive Area 1 five-year review will be performed; therefore this section addresses progress since the third five-year of the NHOU completed in September 2003. The status of recommendations and an update to conclusions are provided below.

5.1 Status of Issues and Recommendations

Issue

There is no vent low to the ground in the chlorine storage building and the chlorine scale is not accurate when tanks are at low levels.

Recommendations

The following recommendations should be implemented as soon as possible to ensure the safety of BOU workers, but no later than the next six months:

1. Install a vent low to the ground in the chlorine storage building, in accordance with health and safety regulations for chlorine storage facilities.
2. Replace or repair the chlorine tank scale.

Status Update

The chlorine vent was repaired by LADWP promptly in late 2003. At this time the chlorine tank scale is intermittently off by 1 pound. Replacement parts have been ordered and repair of the chlorine tank scale is planned for September 2004.

Issue

The reviewers found excessive white particulate dust in the blower room of the NHOU treatment system, possibly originating from the adjacent property.

Recommendations

1. Submit a Public Records Request to SCAQMD to find out the type of permit under which the adjacent property operates, what constituents are emitted, and if there are any monitoring requirements associated with the permit (within the next six months).
2. Request that BOU operators note when particulate is seen coming from the adjacent property (immediately).
3. If necessary, plan and conduct particulate air monitoring at the BOU at a time scheduled in accordance with observations made during task 2. Analyze air particulate samples if warranted (within the next 12 months).
4. The packing material within the aeration tower should be inspected to see if the particulate dust within the blower room is entering the tower (within the next six months).

Status Update

LADWP submitted a Public Records Request to SCAQMD, documented dust emissions when on site, and conducted particulate air monitoring on two occasions. LADWP determined that the dust particulate consisted of perlite, a nuisance dust. Results of monitoring indicated that levels were well below occupational safety and health association standards. LADWP is planning to inspect the aeration tower packing material during the next annually scheduled event.

Issue

The flow meters for wells 4, 6, and 8 are broken.

Recommendations

1. Repair the flow meters by October 31, 2003.

Status Update

LADWP completed all necessary repairs to the three flow meters during September 2003.

Issue

GAC change-out has occurred after exceeding SCAQMD air quality limits at the NHOU.

Recommendations

The following recommendations should be implemented within the next six months.

1. Initiate procedures to obtain a new agreement with a GAC contractor in October 2004.
2. Increase air quality sampling frequency once the GAC has been in use for six months and two rounds of quarterly data have been obtained.
3. Provide summaries of air quality data for the current GAC unit in the quarterly report, as stated previously.
4. Ensure that GAC change-out occurs prior to exceeding SCAQMD air quality limits.
5. If TCE air concentrations increase during initial months of use following GAC change-out, investigate this issue further and perform additional sampling as needed.

Status Update

LADWP plans to renew their GAC contract by the end of September 2004, to cover the period from October 2004 to October 2005. Quarterly air quality monitoring continues with an increase in sampling frequency determined by reaching 90% of air emissions limits, or if the integrity of the GAC bed is suspected. Air quality monitoring data has been reported in EPA monthly reports since late 2003. There have been no air emissions exceedences of SCAQMD permit requirements since the last five-year review. EPA and LADWP are working together to ensure that VOC emissions data is monitored and sampling is performed as needed.

Issue

Complete containment of the TCE groundwater plume is in question based on preliminary modeling results from the first draft of the NHOU enhancement study. It appears that there may be some westward movement of the upper northeast portion and some southern movement of the TCE contaminant plume in the NHOU area. The draft final enhancement study was completed in September 2003.

Recommendations

1. Evaluate TCE plume capture based on the final NHOU enhancement study.

2. If plume growth or migration is confirmed, design and implement actions to increase capture. These recommendations should be presented in the BOU five-year review, which will be completed as an addendum to this report during 2004.

Status Update

EPA has commissioned a study to evaluate data which suggests lateral and vertical plume migration is occurring in the OU. EPA will continue to work with LADWP to evaluate this issue further.

Issue

The material presented in EPA quarterly reports from LADWP is not comprehensive in terms of performance of the treatment system for the NHOU.

Recommendations

In the fourth quarter 2003 quarterly report and all subsequent quarterly reports, the following information should be included:

1. Add a column which provides a status report to the preventive maintenance table of the annual work plan, presented in this report as Table 4-2.

2. Present and evaluate all air monitoring data collected while using the current GAC filters. Discuss the plan for future sampling events and anticipated GAC change-out.

3. Present and summarize all water monitoring data collected during the previous quarter, particularly data for new potential COCs such as nitrate, chromium, hexavalent chromium, and perchlorate (if monitored).

4. Summarize hydraulic evaluation (groundwater elevation and modeling efforts) performed during the previous quarter and any expected issues for the following quarter. This is particularly important given the influence that pumping the North Hollywood well field (west of the NHOU treatment system) apparently has on TCE plume migration.

Status Update

LADWP is presenting air monitoring and water quality data and quarterly EPA reports are more comprehensive. Based on further evaluation, semi-annual (2nd and 4th Quarters) capture zone and mass removal analyses for inclusion in EPA quarterly reports is recommended. EPA and LADWP are working together to resolve additional components of this issue and implement recommendations.

Issue

NHOU treatment system O&M issues are complex. Management of reporting requirements for various agencies involves multiple departments within LADWP, which further complicates the project as a whole. The five-year review process conducted for this BOU has revealed that there is not a central project manager to track all of the activities and personnel involved with this project.

Recommendations

Within the next three months, expand the responsibilities of the current LADWP project manager to include all aspects of the NHOU remedy, specifically, but not restricted to:

1. Managing any and all operation and maintenance problems.
2. Ensuring the preventive maintenance schedule is followed and completed.
3. Managing all sampling (air and water) activities related to the BOU.
4. Managing all reporting for the NHOU remedy (EPA and DHS).
5. Managing evaluation of hydraulic containment.
6. Effectively communicating redefined roles and responsibilities within LADWP (refers to tasks 1 through 5 above).
7. Arranging and attending regularly scheduled meetings to discuss the NHOU remedy.

Status Update

Coordination has been centralized at LADWP and roles/responsibilities are defined. The preventative maintenance schedule is being implemented. A new LADWP project manager joined the project in the summer of 2004. EPA and LADWP are working together to improve management of the NHOU.

Protectiveness Statement

The interim remedy at the NHOU currently protects human health and the environment because the concentrations of TCE and PCE in treated groundwater are less than ROD-selected cleanup goals and no other potential COCs currently exceed health-based standards. However, in order for the remedy to be protective of human health and the environment in the long term, VOC plume containment should be evaluated and addressed as necessary to ensure continued protectiveness. In addition, there should be ongoing reporting of extraction well concentrations of total chromium, hexavalent chromium, and perchlorate—COCs not previously identified in the ROD. Additional sampling and reporting is recommended. In order to provide continued protectiveness in the long-term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be made.

A protectiveness determination for Area 1 as a whole cannot be made at this time until the five-year review report is complete for the BOU. It is expected that at this will be completed during 2004. This site-wide review will address the long term protectiveness issues noted above.

Status Update

EPA is working with LADWP and its contractor to assess VOC plume containment and improve reporting procedures. A protectiveness determination for Area 1 as a whole is addressed in Section 9 of this report.

6.0 Five-year Review Findings

The following sections discuss findings from the five-year review.

6.1 Five-year Review Process

Rachel Loftin, EPA Remedial Project Manager, led the BOU five-year review.

The five-year review consisted of: a review of relevant documents (Appendix A); a regulatory review; interviews with staff associated with O&M of the treatment system, DHS staff, and the Assistant to the Watermaster; and a site inspection.

Following the release of this document, EPA will issue a public notice indicating that this review has been completed and instructions on how to access a copy of this review.

6.2 Documents Review

As a part of the five-year review process, CH2M HILL conducted a brief review of numerous documents related to site activities. The documents chosen for review primarily focused on 1996 to present but ranged in publication date from 1987 to the present. Appendix A provides a list of the documents reviewed as part of this report.

6.3 Data Reviewed

The following sections describe the periodic reporting and/or monitoring at the treatment facility for the BOU, as required by EPA and DHS.

6.3.1 Water

6.3.1.1 BOU Treatment System

The City has been responsible for day-to-day operations of the BOU treatment facility since March 2001. United Water is the City's current BOU O&M contractor. The water sampling and monitoring requirements that must be met by the City are found in the following documents and are also detailed in Table 6-1:

- The First Consent Decree (United States District Court for the Central District of California 1992)
- DHS Permit Amendment 04-07-00PA-000 November 16, 2000
- *1,2,3-TCP Monitoring Plan* (Lockheed Martin 2000)
- *VO-1 Chromium Blending Plan* (Lockheed Martin 1999)

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
Distribution System	Every Nine Years	Asbestos
Plant Effluent	Annually	Gross Alpha Particle, Gross Beta Particle Radium 226, Radium 228 SOCs and BNAs
	Daily	Nitrate
	Quarterly	Chloride, Electrical Conductance, Turbidity Fluoride, Iron, Manganese, Sulfate Heterotrophic Plate Count MBAS Title 22 (CCR) Metals Total Coliform
	Weekly	1,2,3-TCP Heterotrophic Plate Count Hexavalent Cr, Total Cr, Nitrate Total Coliform VOCs
Plant Influent	Annually	Gross Alpha Particle, Gross Beta Particle Radium 226, Radium 228
	Monthly	Total Cr
	Quarterly	Chloride, Electrical Conductance, Turbidity Fluoride, Iron, Manganese, Sulfate MBAS Title 22 (CCR) Metals Total Dissolved Solids Total Suspended Solids
	Weekly	1,2,3-TCP VOCs
Point of Interconnection	Daily	Fecal Coliform Heterotrophic Plate Count Total Chlorine Total Coliform
	Monthly	Nitrate
Point of Water System Introduction	Weekly	Hexavalent Cr, Total Cr Nitrate
Tower A Effluent	Monthly	VOCs
Tower B Effluent	Monthly	VOCs

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
Well VO-1	Annually	1,2,3-TCP Aluminum, Antimony, Arsenic, Barium Beryllium, Cadmium, Copper Chloride Color Corrosivity Cyanide, Lead, Mercury, Nickel, Selenium MBAS Perchlorate Thallium
	Every Four Years (4Qs)	Gross Alpha Particle
	Every Four Years (4Qs) (if α >15)	Uranium
	Every Four Years (4Qs) (if 5< α <15)	Combined Rd 226/228
	Every Three Years	Bicarbonate Alkalinity, Calcium, Fluoride Hydroxide Alkalinity Iron Magnesium, Manganese, Silver, Zinc Odor Sodium, Specific Conductance, Sulfate Thiobencarb Total Hardness, Turbidity
	Every Three Years (2Qs in a row)	Dibromochloropropane Ethylene Dibromide
	Monthly	Hexavalent Cr, Total Cr Iron, Manganese, Nitrate, Nitrite VOCs
	Quarterly	Carbon dioxide, Carbonate Hardness Dissolved Iron, Dissolved Oxygen Dissolved Oxygen Hydrogen Sulfide Iron Bacteria pH, Temperature, Total Dissolved Solids Total Suspended Solids TRPH

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
Wells VO-2, VO-3, and VO-7	Annually	Aluminum, Antimony, Arsenic Barium, Beryllium, Cadmium, Chloride Color Copper, Cyanide, Lead, Mercury, Nickel Corrosivity MBAS Perchlorate Selenium, Thallium
	Every Four Years (4Qs)	Gross Alpha Particle
	Every Four Years (4Qs) (if α >15)	Uranium
	Every Four Years (4Qs) (if 5< α <15)	Combined Rd 226/228
	Every Three Years	Bicarbonate Alkalinity, Calcium, Fluoride Hydroxide Alkalinity, Iron, Magnesium Manganese, Silver, Sodium, Sulfate Odor, Specific Conductance, Turbidity Thiobencarb Total Hardness Zinc
	Every Three Years (2Qs in a row)	Dibromochloropropane Ethylene Dibromide
	Monthly	1,2,3-TCP Hexavalent Cr, Total Cr Nitrate, Nitrite VOCs
	Quarterly	Carbon dioxide, Carbonate Hardness Dissolved Iron, Dissolved Oxygen Hydrogen Sulfide, Iron Bacteria Temperature, pH Total Dissolved Solids Total Suspended Solids TRPH
Well VO-4 and VO-5	Annually	Aluminum, Antimony, Arsenic Barium, Beryllium, Cadmium, Copper Chloride, Color

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
		Corrosivity
Well VO-4 and VO-5	Annually	Cyanide, Lead, MBAS, Mercury, Nickel
		Perchlorate
		Selenium, Thallium
	Every Four Years (4Qs)	Gross Alpha Particle
	Every Four Years (4Qs) (if α >15)	Uranium
	Every Four Years (4Qs) (if 5< α <15)	Combined Rd 226/228
	Every Three Years	Bicarbonate Alkalinity, Calcium, Fluoride
		Hydroxide Alkalinity, Iron, Magnesium
		Manganese, Silver, Sodium, Sulfate
		Odor, Specific Conductance, Turbidity
		Thiobencarb
		Total Hardness
		Zinc
	Every Three Years (2Qs in a row)	Dibromochloropropane
		Ethylene Dibromide
	Monthly	1,2,3-TCP
		Hexavalent Cr, Total Cr
		Iron, Manganese, Nitrate, Nitrite
		VOCs
	Quarterly	Carbon dioxide, Carbonate Hardness
		Dissolved Iron, Dissolved Oxygen
		Hydrogen Sulfide, Iron Bacteria
		Temperature, pH
		Total Dissolved Solids
		Total Suspended Solids
		TRPH
Well VO-6	Annually	Aluminum, Antimony, Arsenic
		Barium, Beryllium, Cadmium, Copper
		Chloride, Color
		Cyanide, Lead, MBAS, Mercury, Nickel
		Perchlorate
		Selenium
		Thallium

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
	Every Four Years (4Qs)	Gross Alpha Particle
Well VO-6 cont.	Every Four Years (4Qs) (if α >15)	Uranium
	Every Four Years (4Qs) (if 5< α <15)	Combined Rd 226/228
	Every Three Years	Bicarbonate Alkalinity, Calcium, Fluoride Hydroxide Alkalinity, Iron, Magnesium Manganese, Silver, Sodium, Sulfate Odor, Specific Conductance, Turbidity Thiobencarb Total Hardness Zinc
	Every Three Years (2Qs in a row)	Dibromochloropropane Ethylene Dibromide
	Monthly	1,2,3-TCP Hexavalent Cr, Total Cr Nitrate, Nitrite VOCs Carbon dioxide, Carbonate Hardness Dissolved Iron, Dissolved Oxygen Hydrogen Sulfide Iron Bacteria pH, Temperature
	Quarterly	Total Dissolved Solids Total Suspended Solids TRPH
Well VO-8	Annually	Aluminum, Antimony, Arsenic Barium, Beryllium, Cadmium, Copper Chloride, Color Cyanide, Lead, MBAS, Mercury, Nickel 1,2,3-TCP Perchlorate Selenium Thallium
	Every Four Years (4Qs)	Gross Alpha Particle

TABLE 6-1
Burbank Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Frequency	Analysis
	Every Four Years (4Qs) (if α >15)	Uranium
Well VO-8 cont.	Every Four Years (4Qs) (if 5< α <15)	Combined Rd 226/228
	Every Three Years	Bicarbonate Alkalinity, Calcium, Fluoride Hydroxide Alkalinity, Iron, Magnesium Manganese, Odor, Silver Sodium, Sulfate, Specific Conductance Thiobencarb Total Hardness, Turbidity Zinc
	Every Three Years (2Qs in a row)	Dibromochloropropane Ethylene Dibromide
	Monthly	Hexavalent Cr, Total Cr Nitrate, Nitrite VOCs
	Quarterly	Carbon dioxide, Carbonate Hardness Dissolved Oxygen, Dissolved Iron Hydrogen Sulfide, Iron Bacteria Iron Bacteria, Temperature, pH, Total Dissolved Solids Total Suspended Solids TRPH

In addition to the water sampling requirements detailed in Table 6-1 there are the following stipulations as per the *1,2,3-TCP Monitoring Plan* (Lockheed Martin 2000):

- Monthly VOCs samples from each LPGAC bed in use from the ½-sample port.
- Once breakthrough (concentration greater than detection limit) occurs at the ½-sample port (located in the center of the bed), a sample from the ¾ port shall be taken immediately and reported within 48 hours. Sample the ¾ port weekly.
- Once breakthrough occurs at the ¾ port, a sample from the LPGAC bed effluent shall be analyzed within 48 hours, and the bed will be taken offline. Sample plant effluent at point of delivery, point of interconnection (blend influent), and point of water system introduction (nitrate-blended effluent) within 24 hours.

- The City submits (via fax) weekly 1,2,3-TCP sampling results to EPA and DHS.

The purpose of the *VO-1 Chromium Blending Plan* (Lockheed Martin 1999) was to ensure that the concentration of total chromium in plant effluent was less than the MCL of 50 µg/L. This was achieved by controlling the pumping rates from chromium impacted wells (particularly VO-1). The plan is incorporated into the DHS permit; however the pumping scheme described in the chromium blending plan has not been followed since 2000. EPA did not review nor approved this plan.

The second smaller LPGAC system at the BOU, constructed primarily for Tank-600 waste (VPGAC regeneration condensate), consists of LPGAC vessels AD 610 A and B. Effluent from this system is discharged to the storm drain in accordance with the most recent NPDES permit application dated April 14, 2000. NPDES regulated sampling requirements include:

- Sampling of lead and lag vessel effluent monthly.
- Sampling of the lag vessel effluent 48 hours after a detection of VOCs in the lead vessel effluent; continue with weekly sampling until the lead vessel carbon is changed-out.

As per the stipulations of the second Consent Decree, Section XI A, Appendix V, Section II, B3, the City (formerly Lockheed) is responsible for submitting monthly reports to the EPA. These reports summarize sampling activities performed, pumping credits accrued (when required), planned activities and submittals, preventative and necessary maintenance performed (GAC bed operations), operational problems and attributed down time, the City's water request and amount delivered, pumping rates from individual extraction wells, and effluent sampling results (nitrate only). All monthly reports have been submitted in accordance with the Second Consent Decree, except when the system was shut-down and reporting was excused by EPA.

The City submits monthly reports to DHS in accordance with DHS Permit Amendment 04-07-00PA-000. These reports summarize: sampling activities performed, planned activities and submittals, preventative and necessary maintenance performed (GAC bed operations), operational problems and attributed down time, the City's water request and amount delivered, pumping rates from individual extraction wells, all sampling results collected in accordance with the permit requirements, and operations information (e.g., LPGAC backwash, chromium blending, treatment train air/water ratio, air stripping performance data). Water delivered from the blend point must comply with DHS MCLs and action levels. To date, there were no reported exceedences of MCLs or action levels in water samples from the blend point. All reports have been submitted to DHS and EPA in accordance with the DHS permit.

6.3.1.2 Groundwater Monitoring Program

EPA conducts a basin-wide groundwater monitoring program in addition to the site-specific BOU monitoring program conducted by Lockheed.

From 1992 to the present, CH2M HILL has submitted basin-wide annual and semi-annual groundwater monitoring reports to the EPA detailing quarterly sampling events. The basin-wide groundwater monitoring reports contain analytical data from: remedial investigation monitoring wells, individual sites within Area 1 managed by the RWQCB or Department of

Toxic Substances Control, LADWP production wells, and Lockheed Martin. CH2M HILL manages all available groundwater quality and water level data collected from various SFV Basin sources in a Geographic Information Systems database. Groundwater monitoring reports from 1998 to 2004 were reviewed (CH2M HILL 2001a, 2002b, 2003b, 2004). Currently the EPA monitoring program has divided the remedial investigation monitoring wells into two categories: a quarterly sampling program and an annual sampling program. Approximately 48 remedial investigation monitoring wells (noted as SFVRI cluster wells on Figure 6-1) are sampled quarterly for VOCs including methyl *tertiary*-butyl ether (MtBE), nitrate/nitrite, and hexavalent chromium. The annual sampling program includes all 84 of the originally installed remedial investigation monitoring wells. However, due to declining water levels and/or mechanical problems each annual sampling event includes approximately 64 remedial investigation monitoring wells are sampled for the above-mentioned constituents as well as semivolatile organic compounds (SVOCs), perchlorate, dissolved metals, and water quality/chemistry parameters. During fourth quarter 2003, select remedial investigation wells were also sampled for silica, ammonia and sulfide to assist with evaluation of chemical fate and transport. Samples from selected remedial investigation monitoring wells were also collected for analysis of the emerging contaminant of concern 1,2,3-TCP. During each sampling event, groundwater elevation measurements are recorded.

Data presented in the basin-wide groundwater monitoring reports are discussed in terms of shallow and deep zones, both of which are within Region 1 (200 to 280 feet bgs). Wells are categorized as "shallow" zone when the wells' screened interval is within 50 feet of the water table. Conversely, wells are considered "deep" when the screened interval is greater than 50 feet from the water table. Plume map figures presented in this section were created on a regional scale for the SFV basin-wide groundwater monitoring program, and rationale used for their development is currently in review and presented in Appendix B (CH2M HILL 2004). A map detailing the locations of well sampling results used to prepare the plume maps is presented as Figure 6-2.

EPA's SFV database includes data from groundwater sampling activities performed by Lockheed Martin, specific to the Burbank area (local scale). Lockheed Martin has performed groundwater monitoring since 1986. Wells are categorized in terms of groundwater interval: water table zone or B-zone. Lockheed Martin submits semi-annual reports to EPA and the RWQCB summarizing monitoring and sampling activities. Sampling frequency and analytes vary based on *Draft Phase 2 Operational Sampling Plan* (Hydro-Search, Inc. 1997). Generally the analytes sampled include VOCs, general chemistry parameters, metals, hexavalent chromium, gross alpha and beta, and low-level analyses for 1,2,3-TCP. The locations of monitoring wells included in this program are shown in Figure 6-1b. From 1997 to date, water elevation measurements have been collected quarterly for all operational and routine monitoring wells.

Water Level Elevation. Groundwater elevation has decreased in the Burbank area since the start of the remedial action in 1996. Since 1998, the reduction ranges from no significant change to approximately 40 feet. This finding is consistent with basin-wide trends presented by the ULARA Watermaster (2003b). As mentioned previously, decreased water level elevation is due to the combined effect of decreased precipitation/aquifer recharge , BOU treatment system extraction well pumping, and the pumping of well fields in the vicinity of

SFV Area 1. Varied effects on water level elevations are expected, owing to the depth of alluvium across the fault.

TCE. TCE concentrations have generally decreased since startup of the BOU treatment system. Table 6-2 summarizes groundwater monitoring and extraction well data from 1996 to 2003. The maximum concentration of TCE in groundwater monitoring wells decreased from 4,400 µg/L in 1996 to 1,200 µg/L in 2003.

The concentration of TCE in extraction wells has decreased since 1999, as seen in Table 6-2. The maximum concentration of TCE in groundwater extraction wells decreased from 1,300 µg/L in 1999 to 491 µg/L in 2003.

The shallow zone plume area—classified as the area where TCE concentrations are greater than the MCL—has experienced a decrease in TCE concentration since 1999, as shown in Figures 6-3 through 6-7. Maximum concentrations have remained in the vicinity of extraction wells VO-4 through VO-6 during the last 5 years. In 1999, the leading southeast edge of the plume had moved beyond extraction wells, probably owing to the treatment system shutdown during 1998 (Earth Tech 2000b). The southeastern plume boundary has remained relatively stable over the last 5 years, decreasing slightly from 2002 to 2003.

Generally, the concentration of TCE in the deep zone is an order of magnitude less than the shallow zone. Throughout Area 1, the deep zone TCE plume has remained relatively consistent (Figures 6-3 through 6-7). In the Burbank area, there was an increase in the concentration of TCE in the deep zone from 2001 to 2002. This is thought to be due to downward vertical migration from the shallow zone. The vertical migration is probably due to pumping in the BOU wellfield, which extracts groundwater throughout the shallow zone. Locally, the maximum concentration of TCE in the B-zone during 2003 was located south of extraction well VO-2 at monitoring well 3862E.

TABLE 6-2
Burbank Operable Unit TCE Concentration (µg/L) in Groundwater
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) µg/L	Maximum Concentration µg/L (well ID)
Monitoring Wells	1996 (1Q, 2Q, and 3Q)	277	4,400 (B1-CW12)
	1997 (1Q and 3Q)	281	3,300 (3850M)
	1998 (1Q and 3Q)	529	3,824 (C1-CW06)
	1999 (1Q and 3Q)	337	2,600 (B1-CW13)
	2000 (1Q and 3Q)	288	1,700 (B1-CW13)
	2001 (1Q and 3Q)	298	2,000 (C1-CW06)
	2002 (1Q and 3Q)	284	1,300 (C1-CW06)
	2003 (1Q and 3Q)	210	1,200 (3862D)

TABLE 6-2
Burbank Operable Unit TCE Concentration (µg/L) in Groundwater
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) µg/L	Maximum Concentration µg/L (well ID)
Extraction Wells	1996*	NA	NA
	1997*	NA	NA
	1998*	Treatment system not operating (Tank 600)	
	1999*	362	1,300
	2000*	345	1,100 (VO-5)
	2001*	289	1,110 (VO-3)
	2002	219	691 (VO-2)
	2003	218	491 (VO-2)

Notes:
*incomplete data set available.
NA: data not presented in monthly reports.
µg/L: micrograms per liter

PCE. The PCE concentrations in the BOU area have moderately decreased since remedy implementation, as evidenced in the groundwater monitoring reports and individual extraction well data. Groundwater monitoring and extraction well analytical data from 1996 to 2003 are summarized in Table 6-3.

The average PCE concentration in groundwater monitoring wells from 1996 to 2003 ranged from 461 µg/L to 1096 µg/L, with a corresponding maximum range of 4,800 µg/L to 22,040 µg/L. The average PCE concentration in BOU extraction wells ranged from 385 µg/L to 667 µg/L from 1999 to 2002, with a maximum concentration range of 1,254 µg/L to 4,300 µg/L.

Plume definition and migration patterns from 1999 to 2003 for PCE are similar to that of TCE in the shallow zones (Figures 6-8 through 6-12). Locally, the area of high concentration surrounding BOU extraction wells VO-4 and VO-5 decreased from 1998 to 2003 due to extraction and treatment in these areas.

Within Area 1 as a whole, the shallow zone PCE plume has migrated west of the NHOU and southwest of the BOU, probably due to the pumping influences of nearby production wellfields.

The concentration of PCE in the deep zone is generally an order of magnitude less than the shallow zone (Tetra Tech 2003a). Within the deep zone, there are two areas of relatively high concentration of PCE—one located in the vicinity of well VO-7 along Vanowen Street and the other located south of extraction well VO-3. There has been a slight increase in the PCE plume concentration in the deep zone in these locations since 1999. The downward vertical migration may be due to pumping in the BOU wellfield, which extracts groundwater primarily from the A-zone but also throughout the upper alluvium. Locally, the maximum concentration of PCE in the B-zone during 2003 was located approximately 1,000 feet west/northwest of extraction well VO-7 at monitoring well A1-CW05 (130 μg/L) .

In 1999, the leading southeast edge of the deep zone PCE plume had moved beyond extraction wells, likely due to the treatment system shutdown during 1998 which allowed for continued downgradient migration (Earth Tech 2000b). The boundary remained relatively stable from 2001 to 2003.

Within Area 1 as a whole, PCE in the deep zone has migrated northwest of the NHOU, possibly due to the Tujunga wellfield operating in this area. Likewise, the plume has migrated southwest of the BOU, possibly due to pumping at the Whitnall wellfield (west of the BOU) and/or the Verdugo wellfield, located south of the BOU.

TABLE 6-3
Burbank Operable Unit Perchloroethylene Concentration in Groundwater
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) μg/L	Maximum Concentration μg/L (well ID)
Monitoring Wells	1996 (1Q, 2Q, and 3Q)	637	8,700 (B6-CW03)
	1997 (1Q and 3Q)	636	21,400 (3850M)
	1998 (1Q and 3Q)	1,096	22,040 (3850M)
	1999 (1Q and 3Q)	461	4,900 (B1-CW13)
	2000 (1Q and 3Q)	587	13,000 (3850M)
	2001 (1Q and 3Q)	668	6,600 (3850M)
	2002 (1Q and 3Q)	502	4,800 (3850N)
	2003 (1Q and 3Q)	467	4,800 (3860K)
Extraction Wells	1996*	NA	NA
	1997*	NA	NA
	1998*	Treatment system not operating (Tank 600)	
	1999	667	4,300
	2000*	541	1,500 (VO-4)
	2001	506	2,200 (VO-4)
	2002	385	1,254 (VO-4)
	2003	385	1,630 (VO-4)

TABLE 6-3
Burbank Operable Unit Perchloroethylene Concentration in Groundwater
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) µg/L	Maximum Concentration µg/L (well ID)

Notes:
*incomplete data set available.
NA: data not presented in Monthly reports.
µg/L: micrograms per liter

Other VOCs. Concentrations of numerous additional VOCs have exceeded MCLs in samples collected from the BOU area from 1996 to date; however, the BOU treatment system was designed to treat VOC-impacted groundwater. Treatment plant effluent is sampled weekly for VOCs to ensure concentrations are less than the MCL.

Concentrations of cis-1,2-dichloroethene (DCE), carbon tetrachloride and 1,1-DCE have been reported to exceed MCLs in groundwater samples consistently since 1999. During 2003, the MCL for cis-1,2-DCE (6 µg/L) was exceeded once at a concentration of 14 µg/L. The MCL for carbon tetrachloride (5 µg/L) was exceeded in 2003 at a maximum concentration of 11 µg/L (A1-CW09) during this sampling event. The MCL for 1,1-DCE (7 µg/L) was exceeded during the 2003 monitoring event at a maximum concentration of 43 µg/L.

Nitrate. Nitrate has been consistently detected in extraction and monitoring wells in the BOU area at concentrations greater than the MCL of 45 mg/L. Figures 6-13 through 6-17 show estimated plume areas in shallow and deep zones from 1999 to 2003, respectively.

Overall, nitrate concentrations have remained relatively consistent. The maximum concentration of nitrate in a BOU A-zone monitoring well from 1996 to 2003 was 97.9 mg/L in well B1-CW17. In the shallow zone during the past 5 years, the nitrate plume has decreased in size. In 1999, the nitrate plume was within the area of each of the BOU extraction wells. As of 2003, only extraction wells VO-4 through VO-7 were within the plume area.

The maximum concentration of nitrate in a B-zone monitoring well from 1996 to 2003 was 71.2 mg/L in a sample from well B1-CW20. This well is located downgradient of extraction well VO-1. The concentration of nitrate in extraction wells VO-4 and VO-5 consistently exceeded the MCL (45 mg/L), with a maximum concentration of 53 mg/L during 2003.

Metals. This section summarizes sampling results for metals other than chromium, which are discussed separately in Section 6.3.1.3. Other metals are analyzed for in remedial investigation and BOU monitoring wells annually. BOU extraction wells are analyzed for metals in accordance with DHS water purveyor requirements.

Total thallium concentrations in four BOU monitoring wells exceeded the MCL of 2 µg/L during the 2003 monitoring event. The maximum exceedence was detected in a sample from well B1-CW17, with an estimated concentration of 22.1 µg/L.

Radionuclides. Gross alpha radionuclides have been consistently detected at concentrations greater than the MCL of 15 picocuries per liter (pCi/L) in samples from BOU groundwater monitoring wells from 1996 to 2003. The maximum concentration reported was 47.8 pCi/L in 2002. More recently, during the 2003 sampling event, one of the two samples analyzed for gross alpha exceeded the MCL at a concentration of 27.4 pCi/L.

There is only one reported sample for gross beta that exceeded the MCL of 50 pCi/L. This sample was collected in 2002 from well 4959A and had a concentration of 58.2 pCi/L. Sampling results for radium 226 and 228 have never exceeded the MCL of 5 pCi/L.

In April 2003, the sample from extraction well VO-5 exceeded the gross alpha MCL; therefore, this sample was analyzed for uranium. The result of uranium analyses was 16.52 pCi/L, less than the MCL of 20 pCi/L.

SVOCs. There were no reported SVOCs in remedial investigation monitoring wells from 1998 to 2003. SVOCs have not been sampled for by Lockheed Martin under the BOU groundwater monitoring program since first quarter 1999, when no SVOC compounds were detected above their reporting limits.

6.3.1.3 Emerging Contaminants

Emerging contaminants include unknown contaminants at the time of the ROD and/or contaminants for which a MCL is not established, or contaminants which the BOU treatment system cannot remediate as currently constructed.

Chromium. Total chromium was first sampled for in the basin-wide groundwater monitoring program in 1992 and by Lockheed Martin for the BOU in 1993. The current State of California MCL for total chromium is 50 µg/L.

From 1997 to 2000, total chromium concentrations exceeding the MCL were consistently observed in three shallow zone BOU monitoring wells with a maximum concentration of 655 µg/L observed in well B1-C12 (east of extraction well VO-1).

Figures 6-18 and 6-19 are total dissolved chromium plume maps for Area 1 as a whole from 2001 and 2002. A comprehensive review of chromium data in the SFV database from 2003 was performed and it was determined that changes in total dissolved chromium concentrations were not significant enough to warrant revisions and production of a 2003 total chromium regional plume map. Therefore, the local BOU groundwater monitoring program total chromium plume maps from first quarter 2004 are presented as Figures 6-20a and 6-20b. However, it should be noted that there are differences in the rationale, scale and datasets used for preparation of the local BOU plume maps compared to those used to create the regional maps. Specifically, Lockheed Martin has assigned zones (water table versus B-zone) to each well based on criteria that differs from the regional assignments of shallow and deep based on depth to water and screened interval. Additionally, there is a reduction in resolution in regional plume maps, compared with local maps, and there is potentially some local variability lost due to scale differences. Lastly, the dataset used for the regional maps is substantially larger than that of the local BOU groundwater monitoring program, which includes only data collected by Lockheed Martin.

As seen in Figures 6-18 and 6-19, total chromium is primarily limited to the shallow zone, with high concentrations in the vicinity of extraction wells VO-6, VO-2, and VO-1 in 2002. Because the BOU treatment system is not designed to remediate chromium, in 1999 DHS required a chromium blending plan to ensure that the influent concentration was less than the State MCL for total chromium. Throughout 1998 and 1999, the concentration of total chromium in extraction well VO-1 consistently exceeded the MCL, at a maximum concentration of 110 µg/L 1999. In October 2000, pumping from well VO-1 was shut down due to a total chromium concentration of 53 µg/L in a sample from well VO-1. From 2001 to 2003, the concentration of total chromium did not exceed the MCL in any BOU extraction well. During first quarter 2004 the total chromium plume exceeding the MCL was located cross-gradient (northeast) of extraction well VO-1. The chromium blending plan has been used with a modified flow rate since approximately 2000. The 2002 plume map indicates that total chromium was present in the deep zone groundwater in the vicinity of extraction well VO-6 and downgradient of extraction well VO-1.

Hexavalent Chromium. Hexavalent chromium was first analyzed by the BOU groundwater monitoring program in 1993 and in remedial investigation wells during 1998. Beginning in 1999 EPA has included hexavalent chromium as a part of the quarterly analytical suite (CH2M HILL 2004). There is neither an established MCL nor a DHS action limit for hexavalent chromium, therefore the State and Federal MCLs for total chromium, 50 µg/L and 100 µg/L, respectively, are used to evaluate hexavalent chromium levels. From 1996 to 2001, hexavalent chromium has been consistently detected at high concentrations in wells B1-CW22, B1-CW17, and B1-CW12. The maximum concentration from this data set was from a sample from well B1-CW12 at 150 µg/L in 1999.

Hexavalent chromium has been observed in BOU extraction wells at concentrations ranging from less than the detection limit to a maximum of 47.2 µg/L at VO-1 in 2001. During 2003, the maximum hexavalent chromium concentration reported in a sample from a BOU extraction well was 27.5 µg/L from well VO-1 (March 2003).

Perchlorate. There is no established MCL for perchlorate. Current *EPA Interim Guidance* (January 2003) provides an action range from 4 to 18 µg/L. In 2004, the DHS action level for perchlorate was modified to 6 µg/L. Samples from remedial investigation monitoring well NH-VPB-12 contained the highest perchlorate concentration within Area 1 during 1999, 2000, and 2001, with concentrations of 4.4 µg/L, 5.3 µg/L, and 6 µg/L, respectively. This well is located east/southeast of extraction well VO-1, was last sampled in December 2001, and is currently is listed as "dry" due to declining water levels. Perchlorate was sampled for under the BOU groundwater monitoring program during first quarter 2004 per the RWQCB request. Perchlorate was detected above the reporting limit in samples from three wells of the 23 monitoring wells sampled at a maximum concentration of 4.4 µg/L. Based on the limited data reviewed collected under the DHS permit, perchlorate was detected once historically in a BOU extraction well; however perchlorate has not been detected in BOU extraction wells in recent years.

MtBE. MtBE was first analyzed for in 1999. In 1999, the DHS action limit for MtBE was 5 µg/L; this action limit was raised to 13 µg/L in 2000. There is no federal MCL for MtBE.

MtBE has been consistently detected in remedial investigation well NH-VPB-01 (located south of the BOU) during from 1999 to 2003, with concentrations decreasing from 32 µg/L to less than the detection limit of 0.5 µg/L in 2004. MtBE has been detected as a part of BOU groundwater monitoring program at a maximum concentration of 57 µg/L during 2003 monitoring.

1,4-dioxane. 1,4-dioxane was first analyzed for in 1997 under the EPA remedial investigation groundwater monitoring program. The current SAL for 1,4-dioxane is 3 µg/L; there is no federal MCL for 1,4-dioxane. There are no known concentrations in remedial investigation wells greater than the SAL upgradient from the BOU. 1,4-dioxane was sampled for under the BOU groundwater monitoring program during first quarter 2004 per the RWQCB request. 1,4-dioxane was detected above the reporting limit in one sample (3850N) of the 23 monitoring wells sampled at a concentration of 2.3 µg/L.

1,2,3-TCP. In June 2000, 1,2,3-TCP was detected in plant effluent at concentrations greater than the SAL. The plant was shut down, and a 1,2,3-TCP monitoring plan was implemented on July 14, 2000. 1,2,3-TCP was also detected at a concentration greater than the SAL in treatment plant effluent during March 2002, October 2002, January 2003, December 2003, and January 2004.

There is no MCL for 1,2,3-TCP, and the SAL is 0.005 µg/L. 1,2,3-TCP was first analyzed for in 2000; however, for remedial investigation monitoring well data, the VOC method detection limit was not as low as the SAL. From February 2002 to date, EPA Method 504.1 has been used to analyze for 1,2,3-TCP at the BOU and at selected remedial investigation monitoring wells, with a minimum detection limit of 20 parts per trillion.

In 2003, 1,2,3-TCP was detected at a concentration great than the SAL in eight remedial investigation wells downgradient of the site at a maximum concentration of 0.13 µg/L. As a part of the BOU groundwater monitoring program, 1,2,3-TCP was reported at a historic maximum concentration of 110,000 µg/L in a sample from well A1-CW07. This well is located approximately 1,250 feet north of extraction well VO-6. In 2003, there were two distinct A-zone 1,2,3-TCP plumes of a concentration greater than 100 µg/L upgradient of the BOU. The first plume is approximately 400 by 600 feet in the vicinity of monitoring well A1-CW07. The second plume is approximately 400 by 600 feet in the vicinity of MW-2 (Tetra Tech 2003c).

Within the B-zone, 1,2,3-TCP was reported at a maximum concentration of 310 µg/L in a 2004 sample from well 3852H located south of BOU extraction well VO-6.

1,2,3-TCP has been detected in all extraction wells at concentrations exceeding the SAL. The maximum detected concentration was 57 µg/L in a sample from well VO-6 collected in 2001.

6.3.1.4 NPDES Permit Sampling

The BOU has operated under a NPDES permit since October 1998. Specifically, this permit pertains to the second smaller LPGAC treatment system constructed in 1998 for Tank-600 waste. The permit requires monthly sampling for VOCs and water quality parameters at the lead and lag bed effluent. If there is a detect of VOCs in effluent from the lead bed, the lag bed effluent shall be sampled within 48 hours for VOCs; sampling shall continue until the lead bed is replaced.

Since 1998, monthly reports submitted to EPA state that the BOU has operated within NPDES application guidelines and provide the total amount of discharge to the storm drain as well as sampling dates. From March 2003 to date, the actual sampling analytical results collected under the NPDES permit have been presented in monthly reports. The January 2001 monthly report noted that TCE and PCE were detected in the lead bed effluent sample and that LPGAC changeout followed; however, lag bed sampling results were not provided. Based on the limited data set presented in monthly reports, the BOU has been operating within the substantive requirements of the NPDES permit.

6.3.2 Air

The BOU air strippers blow air over VOC-contaminated groundwater, which transfers the remaining VOCs to the air; two VPGAC units then filter the air prior to discharge into the atmosphere. Air emissions are monitored quarterly, at a minimum, to ensure substantive compliance with SCAQMD regulations. Monitoring is necessary to determine VOC loading on the VPGAC vessels and the efficiency of the VPGAC vessels. Samples are collected from the inlet to the lead bed, between the lead and lag bed (midpoint), and after the lag bed but before exiting from the stack. Samples are collected from both VPGAC trains at approximately the same time.

To demonstrate substantive compliance with SCAQMD regulations, per EPA's request, on May 10, 2000, Lockheed Martin submitted *Groundwater Treatment System Emissions Evaluations SCAQMD* (Earth Tech 2000b). In accordance with District Rule 212, the maximum individual cancer risk was assessed for the entire BOU treatment system and accounted for the proximity (less than 1,000 feet) to a school. The evaluation concluded that the cancer risk is less than ten-in-one million and the Cancer Burden is less than 0.5 for the BOU. Additionally, non-cancerous health risk for both chronic and acute hazard index totals are less than 1.0 which is considered insignificant under the District's Risk Assessment for Rules 212 and 1401 Guidelines. The evaluation assumed that emissions would decrease over time; therefore compliance with Rule 212 was expected and a public notice was not required. PCE and TCE accounted for 29 percent of the VOC mass used to calculate risk; the remaining contributing VOCs include 1,1-DCE, cis-1,2-DCE, chloroform, and trichlorotrifluoroethane. However, the evaluation does not clearly define how representative the emissions data used to determine risk were of current site conditions (maximum, minimum, or one-time sampling event). The stage at which the air emissions samples are collected in the VPGAC regeneration cycle is an important consideration that was not documented. While air emissions monitoring is performed once per quarter, VPGAC regeneration is every 10 days.

The City is responsible for self-regulation to ensure compliance with the regulatory requirements the SCAQMD. To date, all air emissions sampling has been performed by treatment system operators as reported in the DHS and EPA monthly reports; however, prior to October 2003, the actual analytical results were not presented in these reports. Based on groundwater data (tower influent and effluent) the percentage of PCE and TCE removed has been calculated to evaluate air stripping tower performance.

Table 6-4 provides a comparison of 2004 air emissions data with respective EPA preliminary remediation goals and the concentrations used to determine maximum individual cancer risk in 2000 to satisfy substantive SCAQMD requirements. The TCE and PCE effluent concentrations used in the 2000 assessment are substantially less than the most recent emissions data.

TABLE 6-4
Comparison of 2004 Air Emissions Data with Concentrations used in the 2000 SCAQMD Evaluation
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

				Train A – Effluent Sampling Result			Train B - Effluent Sampling Result			
Compound	**Concentrations used to Calculate MICR (2000)[a]**	**EPA Ambient Air Preliminary Remediation Goal**	**Residential MICR**	**01/26/04**	**04/13/04**	**06/23/04**	**01/26/04**	**04/13/04**	**5/19/04[b]**	**06/23/04**
Trichloroethylene	39	0.017	0.036×10^{-6}	1,900	3,600	3,300	1,600	1,600	1,200	2,300
Perchloroethylene	310	0.67	0.83×10^{-6}	3,900	11,000	4,800	4,900	2,400	1,100	2,500
1,1-dichloroethene	250	210	NC	ND	77	91	ND	ND	ND	100
Cis-1,2-dichloroethene	130	37	NC	ND	48	26	ND	ND	ND	34
Chloroform	210	3.1	0.51×10^{-6}	ND	98	51	ND	ND	ND	82
Trichlorofluoromethane	3.5	730	NC	ND	ND	ND	ND	ND	ND	38

All concentrations shown in micrograms per cubic meter.
Where a duplicate sample was taken, the maximum concentration is shown.
SCAQMD: South Coast Air Quality Management District
MICR: maximum individual cancer risk
NC: not calculated
[a] *Burbank Operable Unit Emissions Evaluation* (Earth Tech 2000b).
[b] Resampling performed because of suspected anomalous midpoint results in April 2004.

6.3.3 Operations and Maintenance Activities, 1996 to 2004

The BOU water production records show a sustained failure to meet the 9,000-gpm extraction rate set by the second Consent Decree. The 2001 *force majeure* claim invoked by Lockheed Martin initiated an evaluation of the possible factors influencing the inability to sustain an extraction rate of 9,000 gpm. Lockheed Martin commissioned an analysis of groundwater elevation changes that concluded that 9,000 gpm could not be sustained and was not necessary to contain and capture the plume. It was suggested that rates of 3,000 to 5,000 gpm could be sufficient, depending upon precipitation, spreading, LADWP pumping rates and location, and previous BOU extraction rates (Earth Tech 2000b). The EPA performed a step test, and it was determined that the aquifer was capable of sustaining 9,000 gpm.

Declining well pump efficiency, well flow instability, VPGAC screen failure, the impacts of 1,2,3-TCP, and the programmable logic controller were cited as O&M problems contributing to the less than 9,000-gpm production (CH2M HILL 2000). EPA and the City are currently planning a performance attainment study to be conducted in 2004-2005. The focus will be on hydraulic capacity evaluation, wellfield performance, and alternatives to increase aquifer yield.

Table 6-5 summarizes treatment system operations from August 1996 to May 2004. For years 1997, 1999, and 2000 monthly reports lacked the detail necessary to attribute production loss to a single factor. Production losses were calculated using a goal of 9,000 gpm on average, adjusted for the City's water demand where applicable. Since startup, the facility has been shut down for various durations due to unexpected maintenance/design issues and the impact of new chemicals that were not known about at the time of remedy implementation. Historical maintenance problems and corrective actions are detailed in Section 4.1.2. These include VPGAC screen failure and LPGAC screen failure.

Individual well O&M activities rarely caused shutdown of the entire system; however, the volume of treated groundwater was often decreased whenever an individual well required maintenance. Well pump and controls-related maintenance are attributed to 24 percent of production loss.

The operational time of individual wells is impacted by the presence of 1,2,3-TCP. 1,2,3-TCP was first documented in plant effluent in June 2000. The BOU treatment system is capable of remediating 1,2,3-TCP impacted groundwater; however, the SAL is very low (0.005 µg/L). Therefore, 1,2,3-TCP is the first contaminant to breakthrough LPGAC beds and is the driver for carbon changeout. Overall, 1,2,3-TCP related issues have contributed to 23 percent of production loss. 1,2,3-TCP breakthrough has been investigated by EPA, the City, and Lockheed Martin. LPGAC issues including screen failure, GAC changeout, and repairs contributed to 18 percent of production loss. Modifications were completed to the LPGAC in 2004 to address carbon fines, screen failure, and the incorrect placement of sampling ports. Despite these modifications, 1,2,3-TCP breakthrough pressure drops, and carbon fines accumulation continue to contribute to lost production, and all parties are working together to further evaluate and address these issues in the 2004-2005 time frame.

Total chromium is another emerging contaminant, not previously identified as requiring treatment in decision documents. The BOU treatment system is not capable of removing total chromium from groundwater. As a result, chromium concentrations in well VO-1 have were the repeated cause of shutdown at this well in order to meet the requirements stated in the chromium blending plan. The goal of the blending plan is to manage influent concentrations at extraction well VO-1, to ensure that the concentration of total chromium in effluent is less than the State MCL of 0.50 µg/L. Because chromium levels have decreased in well VO-1, the chromium blending plan was only utilized from 1999 to 2000 and the City has implemented a modified extraction well pumping plan in its place. Both the chromium blending plan and the City's pumping plan will be revised and reviewed annually to reflect current conditions.

At the request of the RWQCB, an *Evaluation of Chromium Cleanup Technologies for the Burbank Operable Unit* (Earth Tech 2002) was performed in 2002 on behalf of Lockheed Martin. This evaluation considered different technologies to remediate chromium in groundwater at the BOU. The evaluation concluded that the current chromium blending plan was the preferred technology for the treatment/removal of chromium in groundwater. Although this plan meets requirements of the RWQCB, it is still under consideration by EPA which has to date neither reviewed nor approved the evaluation.

VPGAC screen failure first occurred in 1998 and continues to contribute to treatment system downtime for a total of 9 percent loss in production. EPA has approved modifications to the VPGAC vessels, and work is anticipated to be completed in late 2004 or early 2005.

The May 2004 monthly report noted that the packer in well VO-5 cannot hold a charge. The packer was losing approximately 50 psi/day; therefore, the packer is charged to 190 psi every other day. The first quarter 2003 groundwater monitoring report (Tetra Tech 2003a) noted that there was a cone of depression in the B-zone present. The cone of depression was first documented in second and third quarters 2002. This could be due to the hydraulic influence of pumping combined with a leak in the packer in extraction well VO-2. Analytical data suggests downward vertical migration of TCE and PCE at the BOU, warranting further evaluation of the stability of packers.

All required sampling outlined in DHS, SCAQMD, and NPDES permits was performed from 1996 to 2004. Results are discussed in Section 6.3.

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons)						Comment
			LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	
3Q96	**August 1996**		-	-	-	-	-	-	n/a
	September 1996		-	-	-	-	-	-	September 19, 1996 carbon fines in the Valley Forebay; plant shutdown
	Loss Volume	Not Documented	-	-	-	-	-	-	
	Delivered Volume	245,125,685							
	Efficiency	n/a							
4Q96	**October 1996**		-	-	-	-	-	-	n/a
	November 1996		-	-	-	-	-	-	November 18, 1996 plant restarted following carbon fines investigation
	December 1996		-	-	-	-	-	-	n/a
	Loss Volume	Not Documented							
	Delivered Volume	380,481,732							
	Efficiency	n/a							
1Q97	**January 1997**		-	-	-	-	-	-	n/a
	February 1997		-	-	-	-	-	-	n/a
	March 1997		-	-	-	-	-	-	n/a
	Loss Volume	Not Documented							
	Delivered Volume	757,424,190							
	Efficiency	n/a							
2Q97	**April 1997**		-	-	-	-	-	-	n/a
	May 1997		-	-	-	-	-	-	n/a
	June 1997		-	-	-	-	-	-	n/a
	Loss Volume	Not Documented							
	Delivered Volume	966,280,464							
	Efficiency	n/a							
3Q97	**July 1997**		-	-	-	-	-	-	n/a
	August 1997		-	-	-	-	-	-	n/a
	September 1997		-	-	-	-	-	-	n/a
	Loss Volume	Not Documented							
	Delivered Volume	1,008,341,118							
	Efficiency	n/a							
4Q97	**October 1997**		-	-	-	-	-	-	n/a
	November 1997		-	-	-	-	-	-	n/a
	December 1997		-	-	-	-	-	-	From December 15, 1997 to December 12, 1998 no water was delivered to the City due to Tank 600 issue.
	Loss Volume	Not Documented							
	Delivered Volume	678,706,304							
	Efficiency	n/a							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons) LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	Comment
1Q98 to 3Q98	1 Q 1998		-	-	-	-	-	-	Treatment plant water discharged to the storm drain while DHS permit negotiations continue over Tank 600 issue. Temporary operations commendced June 12-18 under EPA approval letter. Shutdown June 18 due to VOC concentrations in effluent from Tank 600 in excess of temporary approval letter.
	2 Q 1998		-	-	-	-	-	-	
	3Q 1998		-	-	-	-	-	-	
	Loss Volume	Not Documented							
	Delivered Volume	161,678,990							
	Efficiency	n/a							
4Q98	October 1998		-	-	-	-	-	-	LPGAC beds flushed, work on tank TK-600
	November 1998		-	-	-	-	-	-	LPGAC beds flushed, work on tank TK-600
	December 1998		-	-	-	-	(216,370,080)	-	VPGAC regenerations, high cadmium in Tank 600; VO-1 offline to June 1999 due to total chromium concentration greater than 50 ppb. Restarted facility, delivering water to the city, under Interim Operations Plan December 12, 1998.
	Loss Volume	(216,370,080)							
	Delivered Volume	180,774,070							
	Efficiency	45.52%							
1Q99	January 1999		-	-	-	-	(101,435,040)	-	VPGAC regenerations performed; VO-1 offline as of 12/98
			-	-	-	-	(25,920,000)	-	Routine Maintenance
	February 1999		-	-	-	-	(77,760,000)	-	Routine Maintenance; VO-1 offline as of 12/98
			-	-	-	-	(96,307,200)	-	VPGAC and LPGAC regenerations performed
	March 1999		-	-	-	-	-	(92,622,400)	Production losses not attributable to specific factors; VO-1 offline as of 12/98
	Loss Volume	(394,044,640)							
	Delivered Volume	700,749,845							
	Efficiency	64.01%							
2Q99	April 1999		-	-	-	-	(19,440,000)	-	Lightening Strike (36 hour shutdown); VO-1 offline as of 12/98
			-	-	-	-	-	(59,848,200)	Production losses not attributable to specific factors
	May 1999		(3,240,000)	-	-	-	-	-	LPGAC vessels offline; VO-1 offline as of 12/98
			-	-	-	-	-	(32,585,600)	Production losses not attributable to specific factors
	June 1999		-	-	-	-	-	(44,087,580)	Undocumented Deficiency
	Loss Volume	(159,201,380)							
	Delivered Volume	942,254,420							
	Efficiency	85.55%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons)						
			LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	Comment
3Q99	**July 1999**		(2,160,000)	-	-	-	-	-	Carbon bed change out
			-	-	-	-	-	(40,236,640)	Undocumented Deficiency
	August 1999		(3,240,000)	-	-	-	-	-	Carbon bed change out; modifications to Tank 600 completed
			-	-	-	-	-	(13,453,250)	Undocumented Deficiency
	September 1999		-	-	-	-	-	(4,474,000)	Undocumented Deficiency
	Loss Volume	(63,563,890)							
	Delivered Volume	1,124,358,510							
	Efficiency	94.65%							
4Q99	**October 1999**		-	-	-	-	-	(82,900)	Undocumented Deficiency
	November 1999		-	-	-	-	-	(11,599,570)	Undocumented Deficiency
	December 1999		-	-	-	-	-	(11,355,790)	Undocumented Deficiency
	Loss Volume	(23,038,260)							
	Delivered Volume	1,167,500,378							
	Efficiency	98.06%							
1Q00	**January 2000**		(11,340,000)	-	-	-	-	-	Carbon bed change out
			-	-	-	-	(8,200,000)	-	Plant down for leak repair of CL-50
			-	-	-	-	-	(6,609,150)	Undocumented Deficiency
	February 2000		-	-	-	-	-	(9,773,003)	Undocumented Deficiency
	March 2000		-	-	-	-	-	(22,641,256)	Undocumented Deficiency
	Loss Volume	(58,563,409)							
	Delivered Volume	1,017,750,596							
	Efficiency	94.56%							
2Q00	**April 2000**		(11,330,003)	-	-	-	-	-	LPGAC carbon fines in Forebay
			-	-	(11,330,003)	-	-	-	Sand in equipment (attrib to VO-1)
	May 2000		(33,480,000)	-	-	-	-	-	LPGAC design error in vessel screen
			-	-	-	-	-	(13,927,178)	Undocumented Deficiency
	June 2000		-	-	-	(32,400,000)	-	-	TCP detection in effluent at concentration greater than SAL. VO-6 removed from service until 1,2,3-TCP Monitoring Plan approved in July.
			-	-	(34,133,760)	-	-	-	Wellfield pump flows reduced
	Loss Volume	(136,600,943)							
	Delivered Volume	966,719,934							
	Efficiency	87.62%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons) LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	Comment
3Q00	**July 2000**		-	-	-	(313,896,640)	-	-	Entire plant shutdown due to multiple TCP detections thru July 19
	August 2000		-	-	-	-	(42,567,000)	-	Treatment plant Effluent pipe repair
			-	-	(75,089,003)	-	-	-	Wellfield pump flows reduced
			-	-	-	(25,029,668)	-	-	Stop pumping VO-6 due to high TCP
	September 2000		-	-	(131,502,342)	-	-	-	Wellfield pump flows reduced
			-	-	-	(32,875,585)	-	-	Stop pumping VO-6 due to high TCP
	Loss Volume	(620,960,237)							
	Delivered Volume	544,325,791							
	Efficiency	46.71%							
4Q00	**October 2000**		-	-	(93,358,217)	-	-	-	Wellfield pump flows reduced
			-	-	-	(20,005,332)	-	-	Stop pumping VO-6 due to high TCP
			-	-	-	-	(20,005,332)	-	Stop pumping VO-1 due to high Chromium
			-	(51,840,000)	-	-	-	-	VPGAC Screen failure
			-	-	-	-	(540,000)	-	CL-50 Pump change
	November 2000		-	-	(91,206,483)	-	-	-	Wellfield pump flows reduced.
			-	-	-	(19,544,246)	-	-	Stop pumping VO-6 due to high TCP
			-	-	-	-	(19,544,246)	-	Stop pumping VO-1 due to high Chromium
			-	-	-	-	(5,400,000)	-	CL-50 Pump change
	December 2000		-	-	(88,681,316)	-	-	-	Wellfield pump flows reduced
			-	-	-	(19,003,139)	-	-	Stop pumping VO-6 due to high TCP
			-	-	-	-	(19,003,139)	-	Stop pumping VO-1 due to high Chromium
			-	(110,160,000)	-	-	-	-	VPGAC Screen failure
			-	-	-	-	(2,160,000)	-	CL-50 Pump change
	Loss Volume	(560,451,451)							
	Delivered Volume	631,724,787							
	Efficiency	52.99%							
1Q01	**January 2001**		-	-	(212,128,119)	-	-	-	Wellfield pump flows reduced (Aq. Test)
	February 2001		-	-	(91,228,935)	-	-	-	Wellfield pump flows reduced (Aq. Test)
			-	(91,228,935)	-	-	-	-	VPGAC Screen failure
	March 2001		-	-	(198,268,406)	-	-	-	Wellfield pump flows reduced (Aq. Test)
	Loss Volume	(592,854,394)							
	Delivered Volume	557,675,002							
	Efficiency	48.47%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons)						Comment
			LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	
2Q01	**April 2001**		-	-	(114,899,690)	-	-	-	Wellfield pump flows reduced (Aq. Test)
	May 2001		-	-	(43,632,791)	-	-	-	Wellfield pump flows reduced (Aq. Test)
			-	(43,632,791)	-	-	-	-	VPGAC Screen failure
			-	-	-	(43,632,791)	-	-	LPGAC shutdown due to TCP breakthrough
			-	-	-	-	-	(131,029)	Undocumented Deficiency
	June 2001		-	(76,528,800)	-	-	-	-	VPGAC Screen failure
			-	-	-	(76,528,800)	-	-	LPGAC shutdown due to TCP breakthrough
	Loss Volume	(398,986,691)							
	Delivered Volume	931,331,986							
	Efficiency	70.01%							
3Q01	**July 2001**		-	-	(12,213,584)	-	-	-	Wellfield pump flows reduced (Aq. Test)
	August 2001		-	-	-	-	(25,920,000)	-	Motor Control Center (MCC) construction
			-	-	(38,016,000)	-	-	-	VO-8 Motor failed
			-	-	-	(5,184,000)	-	-	VO-6 run low to control 1,2,3-TCP Conc.
			-	-	-	-	-	(5,040,000)	Undocumented Deficiency
	September 2001		-	-	-	(19,008,000)	-	-	TCP breakthrough on two adsorbers
			-	-	-	(15,120,000)	-	-	TCP breakthrough on two adsorbers
			-	-	-	-	(1,800,000)	-	Power failure
			-	-	-	(8,640,000)	-	-	TCP breakthrough on two adsorbers
			-	-	-	(59,400,000)	-	-	TCP breakthrough on two additional adsorbers
	Loss Volume	(190,341,584)							
	Delivered Volume	1,001,540,340							
	Efficiency	84.03%							
4Q01	**October 2001**		(40,824,000)	-	-	-	-	-	One LPGAC adsorber returned to service
			(4,320,000)	-	-	-	-	-	One LPGAC adsorber returned to service
			(7,200,000)	-	-	-	-	-	One LPGAC adsorber returned to service
			(252,000)	-	-	-	-	-	One LPGAC adsorber returned to service
			-	-	-	-	(8,640,000)	-	Well VO-3 turned off so not to have 7 wells online - operator error
			(5,400,000)	-	-	-	-	-	Carbon fines noted in effluent of LPGAC adsorber AD 750AL
			-	-	(4,320,000)	-	-	-	Well pump VO-4 failure - caused flow fluctuations
	November 2001		-	-	(8,640,000)	-	-	-	Well VO-3 had false low level alarm, probe cleaned and corrected
			-	-	-	(20,160,000)	-	-	Flow reduced for TCP blending purposes
			-	-	-	(11,520,000)	-	-	TCP breakthrough on three adsorbers
			-	-	-	(43,200,000)	-	-	Three LPGAC adsorbers returned to service
			-	-	-	(5,760,000)	-	-	TCP breakthrough on two adsorbers
	December 2001		-	-	-	(14,400,000)	-	-	Flow reduced for TCP blending purposes
			-	-	-	-	(12,960,000)	-	Facility offline due to MWD pipeline inspection
			-	-	-	(86,112,000)	-	-	Low flow due to TCP
			-	(77,760,000)	-	-	-	-	Train B out of service due VPGAC screen failure
	Loss Volume	(351,468,000)							
	Delivered Volume	780,711,542							
	Efficiency	68.96%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons)						Comment
			LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	
1Q02	**January 2002**		-	(51,840,000)	-	-	-	-	VPGAC Screen failure
			(12,960,000)	-	-	-	-	-	Three LPGAC adsorbers returned to service, well pumps offline
			(20,160,000)	-	-	-	-	-	LPGAC bed failure
			-	-	-	-	-	(15,825,130)	Undocumented Deficiency
	February 2002		-	-	(7,200,000)	-	-	-	Well VO-4 offline
			(5,400,000)	-	-	-	-	-	One LPGAC adsorber offline
			-	-	-	-	-	(25,452,993)	Undocumented Deficiency (MWD maintenance Feb 21-25)
	March 2002		(65,520,000)	-	-	-	-	-	LPGAC bed failure
			-	-	-	(25,920,000)	-	-	TCP detected in plant effluent at 0.03 ppb. Shutdown March 7-8.
			-	-	-	(6,048,000)	-	-	Two LPGAC vessel low flow mode due to TCP
			-	-	-	-	-	(7,576,155)	Undocumented Deficiency (VO-3 out of service due to motor repairs)
	Loss Volume	(243,902,278)							
	Delivered Volume	823,236,130							
	Efficiency	77.14%							
2Q02	**April 2002**		(7,560,000)	-	-	-	-	-	One LPGAC vessel offline
			(4,320,000)	-	-	-	-	-	Two LPGAC vessels offline; (VO-3 out of service)
			-	-	-	-	-	(39,171,594)	Undocumented Deficiency
	May 2002		(4,320,000)	-	-	-	-	-	LPGAC bed failure
			(16,200,000)	-	-	-	-	-	LPGAC bed failure (VO-8 out of service)
			-	-	(16,200,000)	-	-	-	Well Pump Flow Reduction (VO-8 out of service)
	June 2002		(3,744,000)	-	-	-	-	-	LPGAC bed failure
	Loss Volume	(91,515,594)							
	Delivered Volume	903,788,646							
	Efficiency	90.81%							
3Q02	**July 2002**		(49,464,000)	-	-	-	-	-	LPGAC bed failure
			-	-	(7,200,000)	-	-	-	Well VO-6 failure
			-	-	-	-	-	(16,289,046)	Undocumented Deficiency
	August 2002		-	-	(20,016,000)	-	-	-	Well Pump Flow Reduction
			-	-	-	-	-	(18,616,479)	Undocumented Deficiency
	September 2002		-	-	(288,000)	-	-	-	Wellfield problem
			(7,560,000)	-	-	-	-	-	LPGAC bed failure; September 5-6 TCP detect in effluent, plant shutdown, lab error
			(15,120,000)	-	-	-	-	-	LPGAC bed failure
	Loss Volume	(134,553,525)							
	Delivered Volume	881,503,072							
	Efficiency	86.76%							
	October 2002		(9,072,000)	-	-	-	-	-	LPGAC bed failure
			(4,032,000)	-	-	-	-	-	LPGAC bed failure
			(2,592,000)	-	-	-	-	-	LPGAC bed failure
			-	-	-	(23,040,000)	-	-	LPGAC bed failure; TCP in effluent 0.013 ppb, shutdown October 30 - November 2.
			-	-	-	-	-	(16,576,999)	Undocumented Deficiency

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons)						Comment
			LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	
4Q02	**November 2002**		(11,520,000)	-	-	-	-	-	LPGAC bed failure
			(1,728,000)	-	-	-	-	-	LPGAC bed failure
			-	-	(3,360,000)	-	-	-	Well Pump Flow Reduction
			-	-	-	-	-	(17,316,410)	Undocumented Deficiency
	December 2002		-	-	-	-	-	-	City of Burbank Request
	Loss Volume	(89,237,409)							
	Delivered Volume	718,109,250							
	Efficiency	88.95%							
1Q03	**January 2003**		-	-	-	-	-	-	City of Burbank Request
			-	-	-	(288,000)	-	-	.011 ppb TCP in AD730AL
			-	-	-	(504,000)	-	-	.006 ppb TCP in AD740BL
			-	-	-	-	(567,000)	-	Air Compressor Failure
			-	-	-	(4,032,000)	-	-	.006 ppb TCP in AD740BL
			-	-	-	(33,264,000)	-	-	.008 ppb TCP in plant effluent -- Complete Shutdown; Forebay effluent is non-detect
			(2,016,000)	-	-	-	-	-	LPGAC bed out of service
			-	-	-	(9,072,000)	-	-	.024 ppb TCP in AD730AU
	February 2003		-	-	-	-	-	-	City of Burbank Request
			-	-	-	-	(16,416,000)	-	Erroneous lab measurement indicates .442 ppb TCP in effluent.
	March 2003		-	-	-	-	-	-	City of Burbank Request
	Loss Volume	(66,159,000)							
	Delivered Volume	711,582,313							
	Efficiency	91.49%							
2Q03	**April 2003**		-	-	-	-	-	-	City of Burbank Request
	May 2003		-	-	-	-	-	-	City of Burbank Request
			-	(40,500)	-	-	-	-	VPGAC control valve failure
			-	-	-	-	(43,110)	-	VO-6 Out of Service
			-	-	-	-	(26,784,000)	-	Sporadic Flow -- One train down
			-	-	-	(2,016,000)	-	-	.016 ppb TCP detected in AD740AL
	June 2003		-	-	-	(2,959,200)	-	-	LPGAC bed remains out of service due to high TCP tests in May
			-	-	-	-	(216,000)	-	VO-2 Offline
			(15,120,000)	-	-	-	-	-	LPGAC bed out of service
			-	-	-	(33,264,000)	-	-	.009 ppb TCP in AD740AU and .008 ppb TCP in AD730AL
	Loss Volume	(80,442,810)							
	Delivered Volume	884,457,189							
	Efficiency	91.66%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons) LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	Comment
3Q03	July 2003		-	-	-	-	(9,576,000)	-	PLC-100 Out of Service
			-	-	-	(12,078,720)	-	-	.009 ppb TCP at AD750AU
			-	-	-	-	(3,648,000)	-	VO-5 failed to run; VO-4 data communication problem
			-	-	-	-	(38,918,880)	-	VO-1 communication problem, LPGAC beds out of service
			-	-	-	-	(2,520,000)	-	Blind installed at Plant
			-	-	-	(64,512,000)	-	-	.015 ppb TCP at AD750BL
	August 2003		-	-	-	(31,435,200)	-	-	.024 ppb TCP in AD740BL, and AD730BL. (VO-5 out of service through May 2004)
			(126,590,400)	-	-	-	-	-	LPGAC bed out of service
	September 2003		(150,984,000)	-	-	-	-	-	LPGAC bed out of service. VPGAC vessel AD32B screen failure, A train shutdown
	Loss Volume	(440,263,200)							
	Delivered Volume	644,129,279							
	Efficiency	59.40%							
4Q03	October 2003		(191,952,000)	-	-	-	-	-	LPGAC Bed Modification Project
	November 2003		(14,636,160)	-	-	-	-	-	LPGAC modification project
			-	-	-	(11,232,000)	-	-	TCP Detected at AD750AL, no concentrations given
			(12,528,000)	-	-	-	-	-	LPGAC bed out of service
			-	-	-	(2,908,800)	-	-	TCP Detected at AD730AL, no concentrations given
	December 2003		(70,519,680)	-	-	-	-	-	LPGAC modification project
			-	-	-	-	(1,403,280)	-	AD 320A out of service
			-	-	-	0	-	-	TCP Detected at AD730AL, no concentrations given
	Loss Volume	(305,179,920)							
	Delivered Volume	669,378,958							
	Efficiency	68.69%							
1Q04	January 2004		-	-	-	-	-	-	City of Burbank Request
			-	-	-	-	(2,304,000)	-	EH-330A out of service
			-	-	-	(11,880,000)	-	-	0.007 ppb TCP detected in plant effluent, shutdown December 31 to January 5
			-	-	-	-	(1,382,400)	-	A-train out of service
			-	-	-	(74,520,000)	-	-	.031 ppb TCP at AD740AL, .018 ppb at AD740BU, and .013 ppb at AD740BL
	February 2004		-	-	-	-	-	-	City of Burbank Request
			-	-	-	-	(4,752,000)	-	Misc plant maintenance
			-	-	-	-	(1,174,800)	-	AD740BU backwash
			-	-	-	-	(1,260,000)	-	AD740AL backwash
	March 2004		-	-	-	-	-	-	City of Burbank Request
			-	-	-	-	(66,251,520)	-	B-train is out of service
	Loss Volume	(163,524,720)							
	Delivered Volume	738,282,637							
	Efficiency	81.87%							

TABLE 6-5
Burbank Operable Unit Treatment System Operations Summary, 1996 to 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site

	Month		Documented Production Losses (gallons) LPGAC	VPGAC	Well Pump	1,2,3-TCP	Other	Undocumented	Comment
2Q04	**April 2004**		-	-	-	-	-	-	City of Burbank Request
			-	-	-	-	(6,216,600)	-	AD 300B repairs
			(2,592,000)	-	-	-	-	-	LPGAC bed out of service
	May 2004		(1,794,240)	-	-	-	-	-	LPGAC bed out of service
			-	-	-	-	(2,016,000)	-	Routine Maintenance
			(869,760)	-	-	-	-	-	LPGAC bed out of service
			-	-	-	(4,691,520)	-	-	.008 ppb at AD740AU, .011 ppb at AD730BL
			-	-	-	(16,500,960)	-	-	.014 ppb at AD730BU, 1.04 ppb at AD730BL, 1.53 ppb at AD740AU
			(27,172,800)	-	-	-	-	-	LPGAC bed out of service
	Loss Volume	(61,853,880)							
	Delivered Volume	614,659,295							
	Efficiency	90.86%							
		Total Losses	(980,833,043)	(503,031,025)	(1,302,912,647)	(1,241,586,601)	(889,421,628)	(525,292,352)	
		Percentage of total loss	18%	9%	24%	23%	16%	10%	

Note: This table is intended to present a general summary of data presented in Monthly Reports, see these reports for greater detail

6.4 Regulatory Review

Section 121(d) of CERCLA requires that remedial actions implemented at CERCLA sites attain any Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be ARARs.

Applicable requirements are those cleanup standards, criteria, or limitations promulgated under Federal or State law that specifically address the situation at a CERCLA site. A requirement is applicable if the jurisdictional prerequisites of the environmental standard show a direct correspondence when objectively compared with the conditions at the BOU.

If a requirement is not legally applicable, the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations sufficiently similar to the circumstances of the proposed response action and are well-suited to the conditions of the BOU. The criteria for determining relevance and appropriateness are listed in 40 CFR 300.400(g)(2).

Pursuant to EPA guidance, ARARs generally are classified into three categories: chemical-specific, location-specific, and action-specific requirements. These classification categories were developed to help identify ARARs, some of which do not fall precisely into one group or another. These categories of ARARs are defined below:

- **Chemical-specific ARARs** include those laws and requirements that regulate the release to the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific hazardous substances. If, in a specific situation, a chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements should generally be applied.
- **Location-specific ARARs** are those requirements that relate to the geographical or physical position of the BOU, rather than the nature of the contaminants or the proposed BOU remedial actions. These requirements may limit the placement of remedial action, and may impose additional constraints on the cleanup action. For example, location-specific ARARs may refer to activities in the vicinity of wetlands, endangered species habitat, or areas of historical or cultural significance.
- **Action-specific ARARs** are requirements that apply to specific actions that may be associated with BOU remediation. Action-specific ARARs often define acceptable handling, treatment, and disposal procedures for hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and emissions of air pollutants.

To-be-considered (TBC) Criteria are requirements that may not meet the definition of an ARAR as described above but still may be useful in determining whether to take action at a site or to what degree action is necessary. This can be particularly true when there are no ARARs for a site, action, or contaminant. TBC criteria are defined in 40 CFR 300.400(g)(3). Chemical-specific TBC requirements are applied in the absence of ARARs or when the existing ARARs are not sufficiently protective to develop cleanup levels. TBC documents are non-promulgated advisories or guidance issued by federal or state government that are not legally binding but that may provide useful information or recommended procedures for remedial action. Although TBC criteria do not have the status of ARARs, they are considered together with ARARs to establish the required level of cleanup for protection of human health or the environment. The critical difference between a TBC and an ARAR is that one is not required to comply with or meet a TBC when deciding on a remedial action.

6.4.1 Five-year Review of ARARs

The ARARs, presented in the following documents, were reviewed for any changes, additions, or deletions:

- ROD signed on June 30, 1989
- ESD #1 signed on November 21, 1990
- Consent Decree signed on January 29, 1991
- ESD #2 signed on February 12, 1997
- Stipulated Amendments to Consent Decree and Proposed Order signed on June 22, 1998
- Second Consent Decree signed on June 22, 1998

The purpose of this regulatory review is to determine if regulations promulgated since the issuance of the above-mentioned documents may now impact the protectiveness of the interim remedy on human health and the environment. In the preamble to the final National Contingency Plan, EPA states that it will not reopen remedy selection decisions contained in RODs (i.e., ARARs are normally frozen at the time of ROD signature) unless a new or modified requirement calls into question the protectiveness of the selected remedy (55 FR 8757, March 8, 1990).

The following requirements have been identified as ARARs:

- **Safe Drinking Water Act (SDWA)** – Requires that treated water from the remedial action for the BOU, upon completion, meet the MCLs for TCE (5 µg/L) and PCE (5 µg/L). Furthermore, all state and federal MCLs in existence are applicable to the treatment plant effluent with the exception of nitrate. The promulgated MCL for nitrate is an ARAR in effect at the time (of the blending) because the water is to be served for the public as a drinking water source as stated in the ESD #2.

- **Resource Conservation and Recovery Act (RCRA)** – Requires that spent hazardous carbon generated from the treatment process, if any, be disposed of at a RCRA Class I disposal facility.

- **Clean Air Act** – Requires the groundwater treatment facility to meet all substantive conditions stipulated in the SCAQMD Regulation XIII and Rule 1401.

6.4.2 Review of Existing and Potential ARARs

A summary of chemical-specific "interim remedial action" potential ARARs and TBCs is provided in Table 6-4. The specific regulations cited for each ARAR contained in Table 6-4 were reviewed for changes since the ESD #1, ESD #2, Amendments to Consent Decree, and Second Consent Decree were issued.

In addition to the chemical-specific ARARs summarized in Table 6-2, the action-specific ARARs contained in the ESD #1, ESD #2, Amendments to Consent Decree, and Second

Consent Decree were reviewed to determine if requirements had been changed or updated. A summary of existing action-specific ARARs and TBCs is provided in Table 6-3. Additionally, a summary of action-specific potential ARARs and TBCs is provided in Table 6-4.

No location-specific ARARs were identified during this review that would require a substantive change to the current remedy.

Based on the regulatory review, none of the requirements contained in Tables 6-6 and 6-7 have been changed or updated in a way that would impact the protectiveness of the remedial actions or require a change in the existing ARARs.

The current versions of the California Code of Regulations (CCR), Title 40 of the CFR, the RWQCB *Water Quality Control Plan for the Los Angeles Region, San Fernando Basin Water Management Plan, California Drinking Water Source Assessment and Protection Program Report* (RWQCB 1995), SCAQMD Rule Book, and the Superfund Amendment Reauthorization Act were consulted via the internet or in hardcopy to review pertinent updates.

TABLE 6-6
Chemical-specific Interim Action Potential ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Findings and Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13160, 13267, 13304	Title 27, CCR, Section 20410, Title 23, CCR, Section 2550.6	Applies to groundwater remediation and monitoring of sites. Groundwater will be remediated and monitored according to Title 27/23 regulations.	Relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Safe Drinking Water Act (40 U.S.C. 300 et seq.).	National Primary Drinking Water Standards (40 CFR Part 141)	It has been determined that the MCL of 5 µg/L for TCE and of 5 µg/L for PCE is the appropriate cleanup level for the San Fernando Valley Ground Water Basin. The ROD stated that the treated water must meet all applicable requirements for drinking water in existence at the time that the water is served.	Applicable. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
RWQCB Water Quality Control Plan (Basin Plan)	Water Quality Control Plan for the Los Angeles Region Chapter 3	The Basin Plan establishes water quality objectives designed to protect beneficial uses of surface and groundwater within the Los Angeles Region. The ROD states that the water should meet all drinking water standards.	Relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Unregulated Contaminant Monitoring Regulation for Public Water Systems	40 CFR §141	This policy contains provision for unregulated contaminant monitoring regulation for public water systems. Including the MCLs for disinfecting byproducts and the MCLs for residual disinfectants 40CFR §141.64 and 65.	This policy is a TBC, since all treated water from the air-stripping facility in the BOU, shall be continuously and reliably chlorinated and residues should be monitored daily.
State of California, Domestic Water Quality and Monitoring Regulations	California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64444 & 64449	This policy contains provision for the domestic water quality regulations for California. It establishes MCLs for primary drinking water chemicals.	Relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.

TABLE 6-7
Action-specific Reviewed ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
Dewater Waste Disposal and Spent Carbon Disposal Waste characterization	40 CFR §261.3(A) (2) (IV)	This RCRA section identifies the types of solid wastes that are subject to regulation as hazardous waste. The spent carbon from the VPGAC Adsorption System is considered a RCRA waste.	Relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Clean Air Act SCAQMD	Regulation XIII and Rule 1401	In California, the authority for enforcing the standards established under the Clean Air Act has been delegated to the State. The program is administered by the SCAQMD in Los Angeles. The BOU will meet the SCAQMD's regulations and rule by adding air emission controls to the air strippers or using steam stripping.	Relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Toxicity Characteristic	40 CFR Subpart 261.24 (a)	A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, EPA's test Method 1311. The extract from a representative sample of the waste contains any of the contaminants listed in table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract. Therefore, recovered solvents, exceeding the toxicity levels in table 1 of this section is considered a hazards waste.	Applicable There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.

TABLE 6-7
Action-specific Reviewed ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
Permit for generation and transportation of hazardous waste	40 CFR Subpart 261, 262, and 263	A permit would be needed to generate or transport hazardous solids, liquids, or sludge. The BOU facility site is technically considered a "generator" because it is the source of hazardous waste materials that may be transported off site for disposal. Therefore, recovered waste solvents must satisfy these requirements to be shipped off site. If spent carbon is characterized as a hazardous waste, the spent carbon must satisfy these requirements to be shipped off site.	Applicable. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Regeneration of the spent carbon from the GAC off-gas treatment system	40 CFR Subpart 261.2(E)(I)(II)	Materials are not solid waste when they can be shown to be recycled by being used or reused as effective substitutes for commercial products.	Applicable. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Onsite hazardous waste handling	40 CFR Subpart 264 I and J 22 CCR, Chapter 30, Article 24 and Article 25	Any water containing hazardous constituents and stored on site for more than 90 days shall be handled as hazardous wasted on site. Such storage shall be in compliance with the substantive requirements of 40 CFR Subpart 264 I and J and 22 CCR, Chapter 30, Article 24, and Article 25.	Applicable or relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
The Off-Site Rule: "Procedures for Planning and Implementing Off-Site Response Actions"[1] This Rule Supersedes both: "Procedures for Implementing Off-Site Response Actions" (Nov, 1987), OSWER Directive 9834.11 AND "The Off-Site Policy"	40 CFR, Part 300.440 [5 p.]	Acts to regulate any remedial or removal action involving the off-site transfer of any CERCLA waste that is conducted by EPA, PRPs, or other federal agencies. This newer rule supersedes and replaces any previous rule or policy regarding off-site transport of waste.	Applicable or relevant and appropriate. There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.

TABLE 6-8
Action-specific Potential ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122-125	Requires permits for the discharge of pollutants from any point source into the waters of the United States.	The BOU is exempt from the requirement from complying with procedural requirements of the ARARs. However, the station is required to comply with the substantive requirements of ARARs. Therefore, the treatment system shall employ the guidelines in the NPDES.
Permits and Permit "Equivalency" Processes for CERCLA On-site Response Actions	OSWER Directive 9355.7-03 – February 10, 1992	Permits and Permit "Equivalency" Processes for CERCLA On-site Response Actions clarifies the EPA policy with respect to attaining permits for activities at CERCLA sites. CERCLA response actions are exempted by law from the requirement to obtain federal, state or local permits related to any activities conducted completely on site.	The BOU is required to comply with the substantive requirements of ARARs. Therefore, the treatment system shall employ the guidelines of federal, state, or local permits.
Disposal of Spent Carbon Availability of Hazardous Waste Facility	42 CFR (C) (3)(B)	Hazardous waste facility availability.	Pursuant to CERCLA section 104(C)(3) (B), the state is required to assure the availability of hazardous waste facility.
Disposal of Spent Carbon Landfill Requirements	40 CFR 761.75 (C) (4)	Landfill requirements.	Toxic Substances Control Act provides the EPA with the ability to grant a waiver when one or more of the technical requirements under 40 CFR 761.75 (b) are not met, as long as it can be demonstrated that the landfill will not present an unreasonable risk to health and the environment.
Groundwater monitoring standards	27 CCR 20415 23 CCR 2550.7.	Monitoring requirements.	Requires general soil, surface water, and groundwater monitoring.

TABLE 6-8
Action-specific Potential ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
RCRA Hazardous Waste Determination	Title 22 CCR, 66261.21, 66261.22(a)(1), 66261.22(a)(2), 66261.23, and 66261.24(a)(1) or Article 4, Chapter 11	Classifies RCRA wastes.	A hazardous waste is considered a RCRA hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity, or if it is listed as a hazardous waste. Most waste determinations will focus on whether the generated waste (e.g., contaminated soil, treatment residuals) could be classified as toxicity characteristic waste as defined by the contaminant concentrations.
California hazardous waste determination	22CCR 66261.24(a)(2)	Classifies non-RCRA wastes.	Wastes can be classified as non-RCRA, State-only hazardous wastes if they exceed the soluble threshold limit concentration or total threshold limit concentration values appropriate.
Land Disposal Restrictions	22 CCR, Division 4.5, Chapter 18, 66268.124, Corrective Action Management Rule, Sections 66264.91; 66264.100; 66264.708; 66279.30; and 66272.1	Identifies hazardous wastes that are restricted from land disposal.	On-site disposal action may be exempt from treatment standards through the Corrective Action Management Unit Rule.
Standards for operators of hazardous waste transfer, treatment and disposal facilities	22 CCR, Division 4.5, Chapter 14, Sections 662264 et seq.	Establishes criteria and standards for operators of treatment, storage and disposal facilities.	Not applicable to CERCLA cleanup. Substantive requirements for closure and post-closure waste piles and tank systems are relevant and appropriate, if necessary.
Standards Applicable to transporters of hazardous waste	22 CCR, Division 4.5, Chapter 13, 66263.10 – 66263.18	Establishes standards that apply to persons transporting hazardous waste in California.	These standards apply to off-site activities and are therefore, by definition, not an ARAR. However, these requirements must be fully complied with when transporting hazardous waste off site.

TABLE 6-8
Action-specific Potential ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
Standards applicable to generators of hazardous waste	22CCR 66262.10	Establishes standards for generators of hazardous wastes in California, including those of manifests, pre-transportation record keeping, and reporting.	Substantive requirements are applicable for carbon disposal.
Spent Carbon Waste Characterization and Disposal	27 CCR 20200(a)(2)	Waste characterization.	Requires that wastes identified as hazardous, designated non-hazardous, or inert solid waste (Sections 23 CCR 2521; 27 CCR 20210, 20220, 20230) be allowed only at waste management units that have been approved and classified.
Dewater Waste Disposal Waste Characterization and Disposal	27 CCR 20210 (2) (C)	Disposal of waste, if groundwater monitoring contents exceed MCLs for COC.	Dewatered sludge may be discharged at a Class III landfill, provided the landfill meets the criteria stipulated under CCR 20210, unless the Department of Toxic Substances Control determines that the waste must be managed as hazardous waste.
Spent Carbon Disposal	40 CFR 268.40	Land disposal requirements.	Attain land disposal treatment standards before putting waste into landfill in order to comply with land disposal restriction.
Spent Carbon Disposal Treatment standards for hazardous wastes	22 CCR 66268	Land disposal requirements.	Compliance with Land Disposal Regulations treatment standards is required if hazardous waste (e.g., contaminated soil) is placed on land. Soil treatability variance may be invoked according to 40 CFR 268.44 (h)(3) and (4).
Permit for generation and transportation of hazardous waste	22 CCR 4.5 Chapter 20	Permits for generators.	These articles establish the requirements for permits needed in order to generate or transport hazardous solids, liquids, or sludge. The BOU facility site is technically considered a "generator" because it is the source of hazardous waste materials that may be transported off site for disposal.

TABLE 6-8
Action-specific Potential ARARs
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
USDOT and DHS Hazardous Material Transportation Rules	49 CFR Subpart 172 and 177	Off-site transportation of hazardous materials.	Off-site transportation of hazardous materials will be governed by the federal and state Department of Transportation regulations. These requirements are incorporated by reference into RCRA regulations and the CCR.

6.4.3 Summary of Changes to Existing ARARs

This section presents a summary of changes to existing BOU ARARs identified in the following decision documents: the 1989 ROD, ESD #1, First Consent Decree, ESD #2, Stipulated Amendments to Consent Decree and Proposed Order, and Second Consent Decree.

6.4.3.1 New Source Review SCAQMD Regulation XIII and Rule 1401

Regulation XIII was adopted on October 5, 1979; it has been amended several times since the ESD #1, ESD #2, Amendments to Consent Decree, and Second Consent Decree were issued with the latest amendment occurring in 2002. Regulation XIII sets forth pre-construction review requirements for new, modified, or relocated facilities in the SCAQMD to ensure that no net increases occur from new or modified permitted sources of non-attainment air contaminants or their precursors.

Rule 1401 was adopted on June 1, 1990; it has been amended several times since the ESD #1, ESD #2, Amendments to Consent Decree, and Second Consent Decree were issued, with the latest amendment occurring in 2003. This Rule sets forth allowable risk limits for maximum individual cancer risk, cancer burden, and non-cancer acute and chronic hazard index (HI) for new, modified, or relocated facilities that emit the toxic air contaminants listed in Table I of this Rule.

6.4.3.2 EPA's Revised procedures for Implementing Off-Site Response Actions ("Off-Site Policy") (EPA OSWER Directive – 9834.11, November 13, 1987)

In September 1993, EPA published [58 Fed. Reg. 49200] the final Off-Site Rule: "Procedures for Planning and Implementing Off-Site Response Actions" amending the NCP (40 CFR 300.440). The 1993 National Contingency Plan amendment supercedes both: "Procedures for Implementing Off-Site Response Actions" (Nov, 1987), OSWER Directive 9834.11 AND "The Off-Site Policy."

6.4.3.3 Action Specific ARARs: Groundwater Reinjection

ARARs applicable to the reinjection water include: RWQCB's Non-degradation Policy and RCRA Section 3020.

In ESD #2, EPA eliminated groundwater reinjection as a requirement based on annual projections that there would be no excess water at the 9,000 gpm extraction rate. Thus, the action-specific ARARs mentioned above are no longer in effect. However, as stipulated in the ESD #2, "If EPA determines that reinjection capacity is necessary for the remedy to meet the Performance Standards or to protect human health or the environment, the development of such capacity shall not be considered an additional response action," and these action-specific ARARs shall remain relevant and applicable.

6.4.3.4 Chemical-specific ARARs

EPA recognizes that ARARs are used to determine final remediation levels and apply only at the completion of the action. Since the remedial action adopted pursuant to the ESD #1 and ESD #2 is an interim action, these chemical-specific ARARs for the groundwater contaminant plume do not apply to the activities undertaken pursuant to the above-mentioned legal documents. However, drinking water standards, including state and federal MCLs, source water monitoring protocols, and treatment technology requirements, must be met during the interim action.

A review of these existing ARARs indicates that, to date, there have been no significant changes or updates that would impact the protectiveness of the remedial actions. Therefore, they remain applicable and relevant, and appropriate for the treatment of groundwater at the treatment system.

6.5 Site Inspection

Representatives of the City of Burbank (United Water) and CH2M HILL performed a BOU inspection on June 1, 2004.

The inspection included the treatment system, well VO-4, and a drive-by inspection of wells VO-1 through VO-3 and VO-5 through VO-8. A summary of the inspection findings is presented below. The BOU inspection checklist and photos are provided in Appendices B and C, respectively.

Conditions during the inspection were favorable, with high temperatures and no precipitation. All inspected areas were secured with adequate fencing with the exception of secured below grade wells which are located in public areas.

Well VO-4 is located in a redeveloped commercial parking area. The wellhead is in a below ground vault and, therefore, was not inspected. Well VO-8 is located in the secured parking lot of the Fire Training Center.

The treatment plant was operating at the time of the BOU visit. The LPGAC vessels, VPGAC vessels, aeration towers, boiler room, aboveground storage tanks, and associated piping were visually inspected. All aboveground storage tanks appeared in good condition. There is a concrete berm as secondary containment around the entire treatment system. Minimal cracking was observed in the containment area.

There is an office on site that contains all necessary project information. The Emergency Response Plan, O&M manuals, maintenance log books, permits, Material Safety Data Sheets, and other project specific information are readily available. In the Control Room, electronic access to current operations data is available.

Overall, the mechanical parts of the treatment system appeared to be in good condition. All piping appeared free of leaks and cracks. The VPGAC and LPGAC units were also in good condition and all sampling ports were accessible.

6.6 Interviews

Interviews were conducted with the City of Burbank and its contractor (United Water), CH2M HILL, the Watermaster, and DHS. Repeated attempts were made to interview the RWQCB; however, no one was available. Interview summary forms are provided in Appendix C.

On June 1, 2004, the following people associated with the BOU were interviewed:

- Richard Bobadilla, BOU treatment system Operator, United Water
- Vic Savage, Project Director, United Water
- Albert Lopez, Project Manager, City of Burbank

At a later date, by telephone, the following people currently and formerly associated with the BOU were interviewed:

- Eric Peterson, Former Project Manager, Earth Tech
- Joseph Crisologo, District Engineer, DHS
- Mark Mackowski, ULARA Watermaster
- Bob Simpson, former construction site manager for the BOU treatment system, Lockheed Martin

All interviewees noted that the treatment system is functioning as expected for TCE and PCE removal; however it is not operating at capacity (9,000 gpm). The concentrations of TCE and PCE in groundwater have decreased in the BOU area since treatment system startup in 1996.

Richard Bobadilla, current BOU Operator, detailed operations procedures and noted that open communication between United Water and the City allow for management of new COCs (1,2,3-TCP and chromium) to ensure that water quality and production targets are met. Vic Savage stated that ongoing improvements are made to the efficiency and operations of the system as policies are reviewed and recommendations implemented as needed.

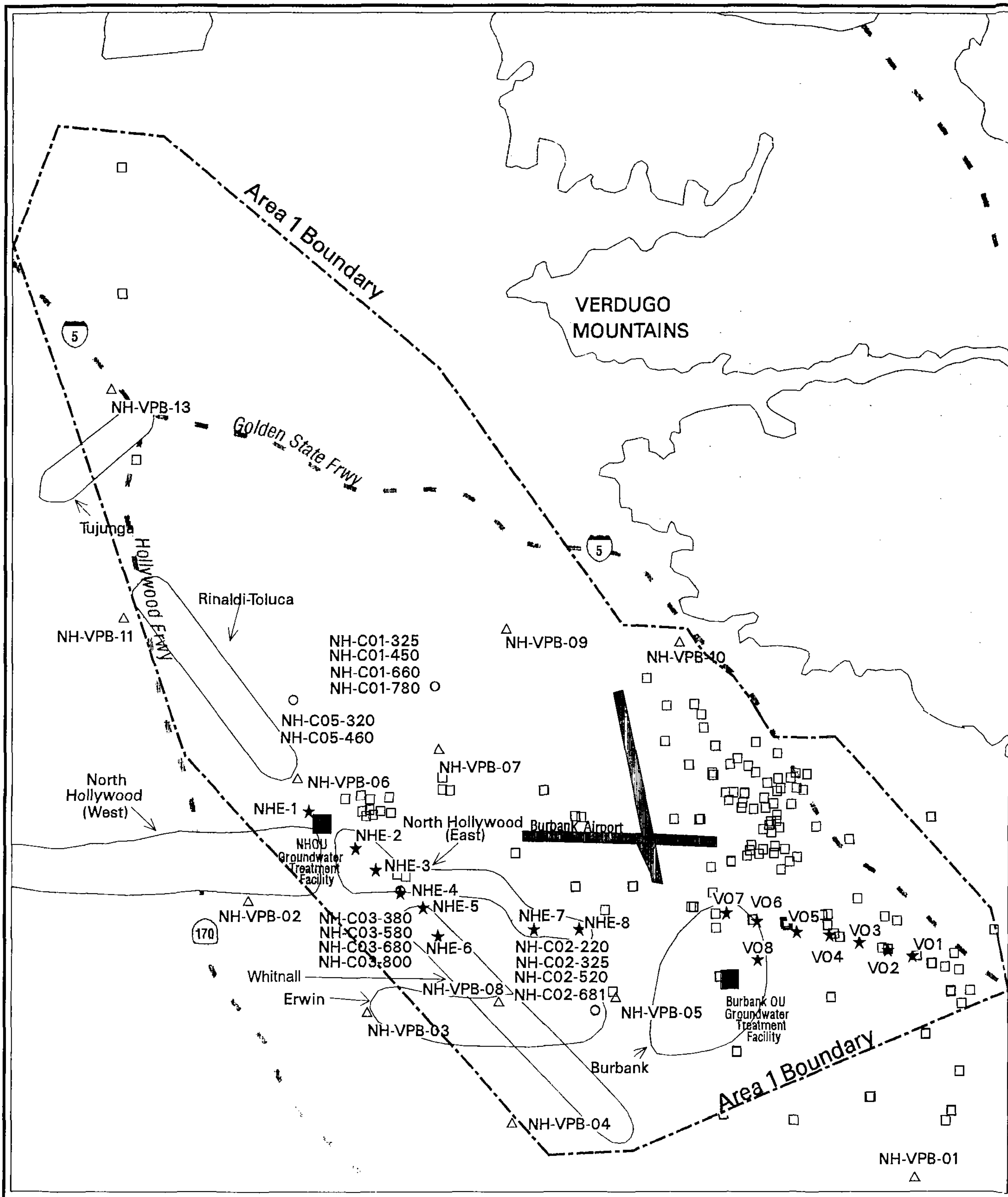
Albert Lopez, the City of Burbank Project Manager, was working on the project in 2000, when operations were planned to be transferred from Lockheed Martin to the City. He stated there was a 3 month transition period because of maintenance issues, moving the transition date from December 2000 to March 2001. Mr. Lopez noted that the 9,000 gpm goal has not been partially met because of VPGAC issues which are currently being addressed. He recommended deflating the packers as outlined in the first O&M manual to increase production capacity. Mr. Lopez stated that ultimately, the goal of the City is to be able to use the wellfield again with no restriction related to contamination.

Eric Peterson, former BOU Project Manager, detailed the historical issues with chromium and Tank 600 and successful corrective actions implemented. Mr. Peterson suggested evaluating the BOU in terms of the ROD plume containment goals.

On July 20, 2004, Joseph Crisologo of the DHS was interviewed via telephone. Mr. Crisologo expressed concern over the presence of new COCs such as 1,2,3-TCP and chromium, in addition to any unknown emerging constituents. Mr. Crisologo was concerned that the high concentration of TCE and PCE may mask the presence of other VOCs at the BOU. He encouraged increasing the capability to assess new COCs. Mr. Crisologo stated that overall, the BOU treatment system is operating within DHS guidelines for VOCs and has been responsive to DHS requirements. Lockheed Martin worked hard to find a laboratory with a reporting limit for 1,2,3-TCP lower than the SAL of 5 parts per trillion. The effects of 1,2,3-TCP on the treatment system are shorter LPGAC run times. Additionally, concern was noted over the fact that hexavalent chromium is unregulated with a revised public health goal due out soon.

Mr. Crisologo noted that BOU operations commenced prior to DHS Policy 97005, a new permitting process for the installation of extraction wells in areas of known or suspected contamination. The new permitting process is extensive in terms of required studies.

On June 14, 2004, Mark Mackowski, Assistant Watermaster, was interviewed via telephone. Mr. Mackowski recommended increasing production to the 9,000 gpm goal and expressed concern over chromium concentration in groundwater, the lack of an MCL for hexavalent chromium, and any impact a low MCL will have on the future of the treatment system's ability to operate. Mr. Mackowski recommended evaluating deflation of packers as an option to increase the extraction rate.



LEGEND:

- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well
- □ Facility Monitoring Well
- ▭ Production Well Field

FIGURE 6-1a
MONITORING WELLS, PRODUCTION WELL FIELDS AND GROUNDWATER TREATMENT FACILITY
San Fernando Valley (Area 1)
Los Angeles County, California

N

0 2100 4200
FEET

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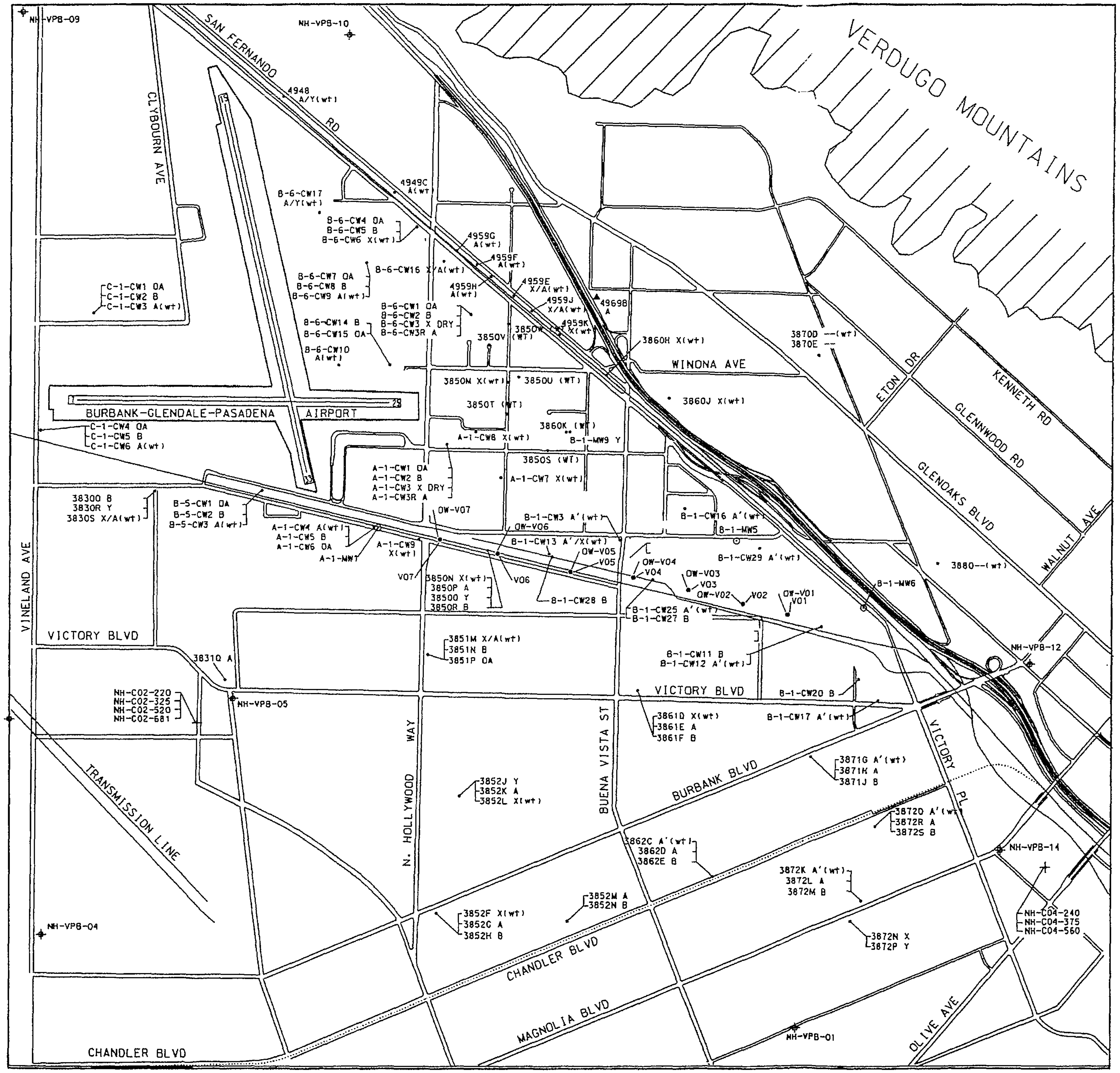

EXPLANATION

WELLS

A-1-CW1	LOCKHEED MONITORING WELL
VOL	LOCKHEED EXTRACTION WELL
4969B	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS MONITORING WELL
CS-VPB-07	EPA VERTICAL PROFILE BOREHOLE (VPB) MONITOR WELL
CS-C03-100	EPA CLUSTER WELL

LOCKHEED MONITORING WELLS ARE SCREENED IN THE FOLLOWING HYDROSTRATIGRAPHIC ZONES. THE HYDROSTRATIGRAPHIC ZONES ARE LISTED FROM SHALLOWEST TO DEEPEST.

YOUNGER ALLUVIUM

A'
X
A
Y
B

OLDER ALLUVIUM

OA

-- HYDROGEOLOGIC ZONE UNDEFINED

(wt)[L] INDICATES MONITORING WELLS COMPLETED AT OR NEAR THE WATER TABLE

0 900 1,800

FEET

FIGURE 6-1b
BOU MONITORING WELL LOCATIONS
SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

Source: Earth Tech, 2000

CH2MHILL

316329.FR.01-Monitoring well locations-8/9/04-ccc

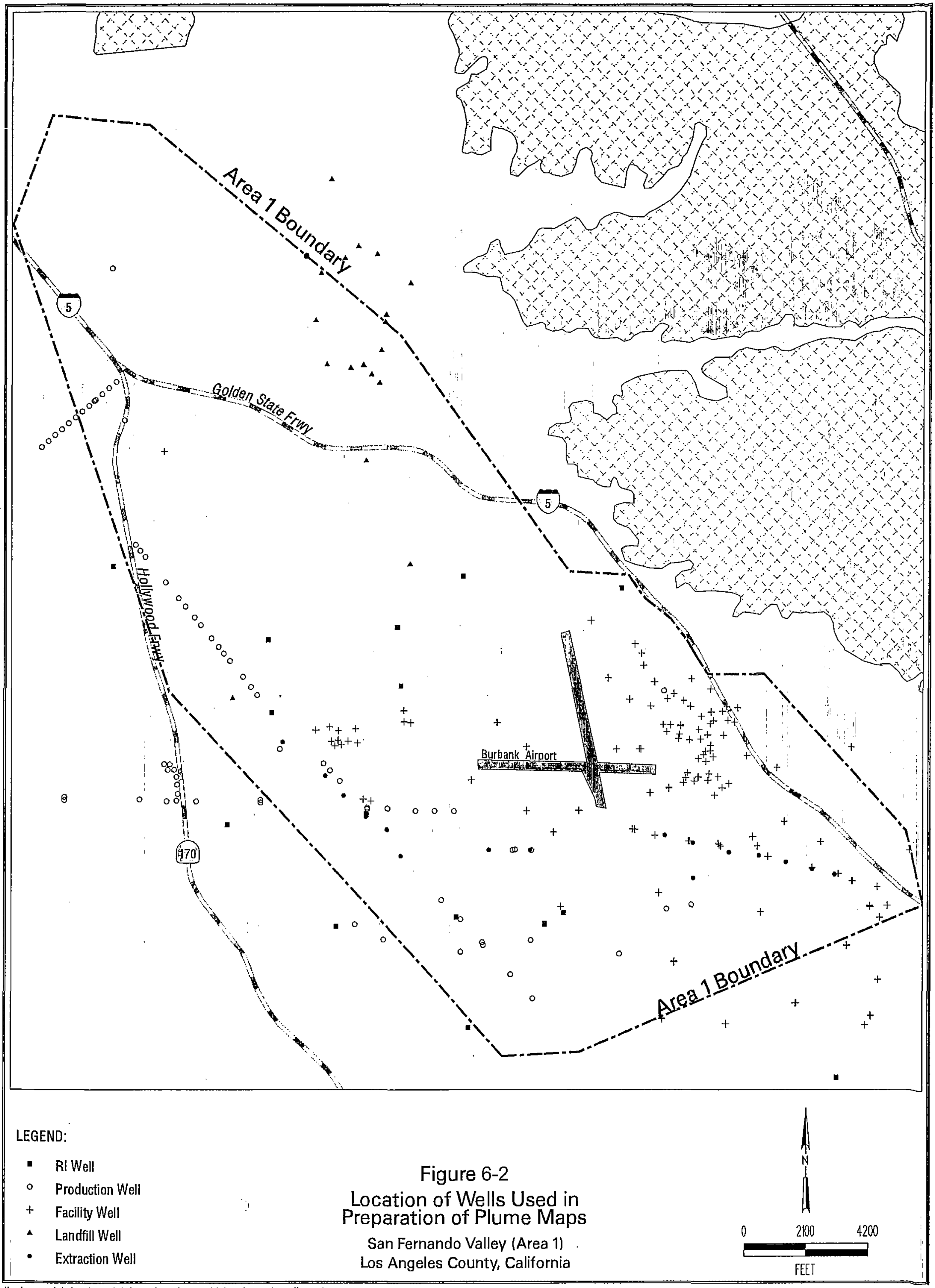

Figure 6-2
Location of Wells Used in Preparation of Plume Maps
San Fernando Valley (Area 1)
Los Angeles County, California

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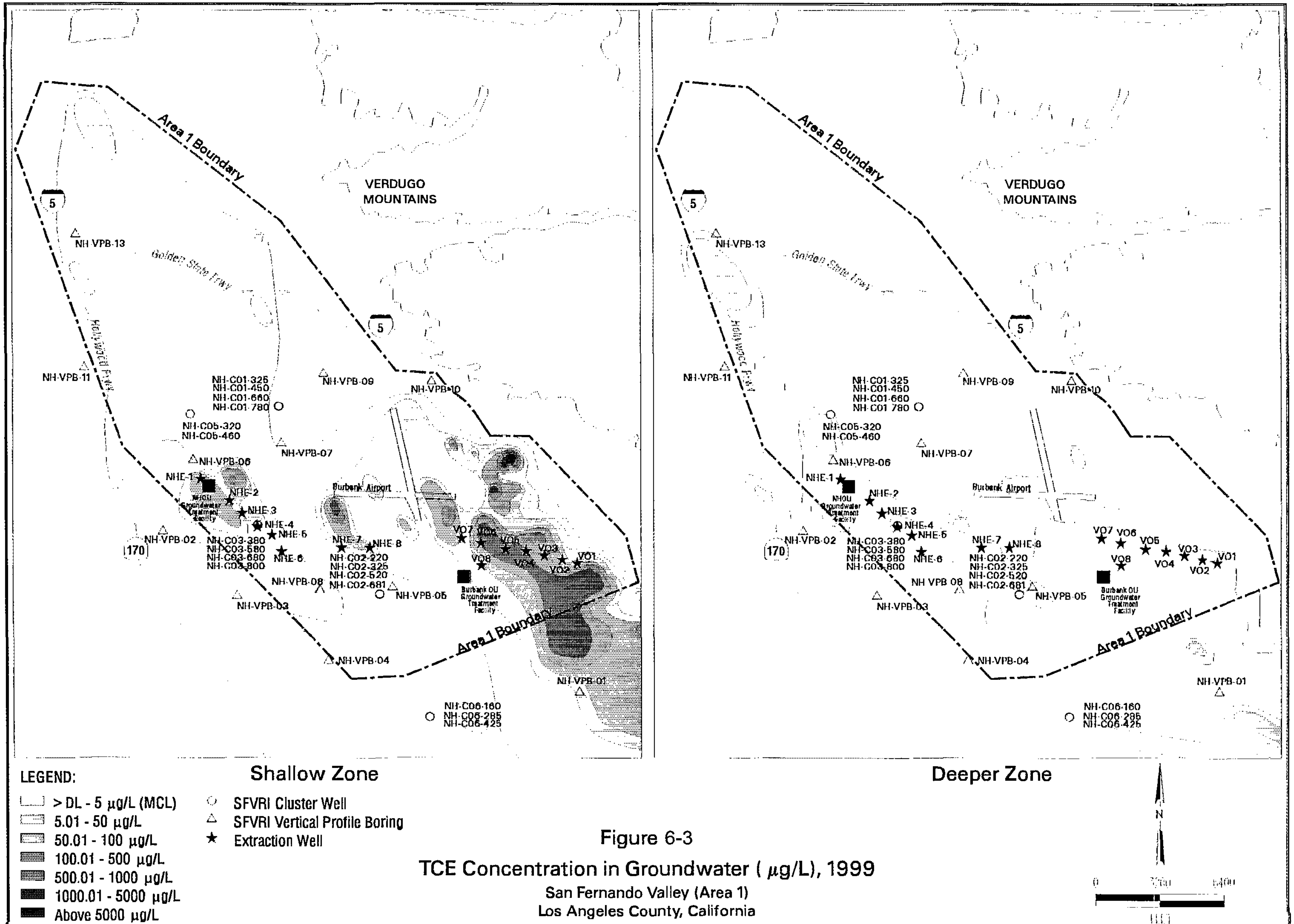

Figure 6-3

TCE Concentration in Groundwater (µg/L), 1999

San Fernando Valley (Area 1)

Los Angeles County, California

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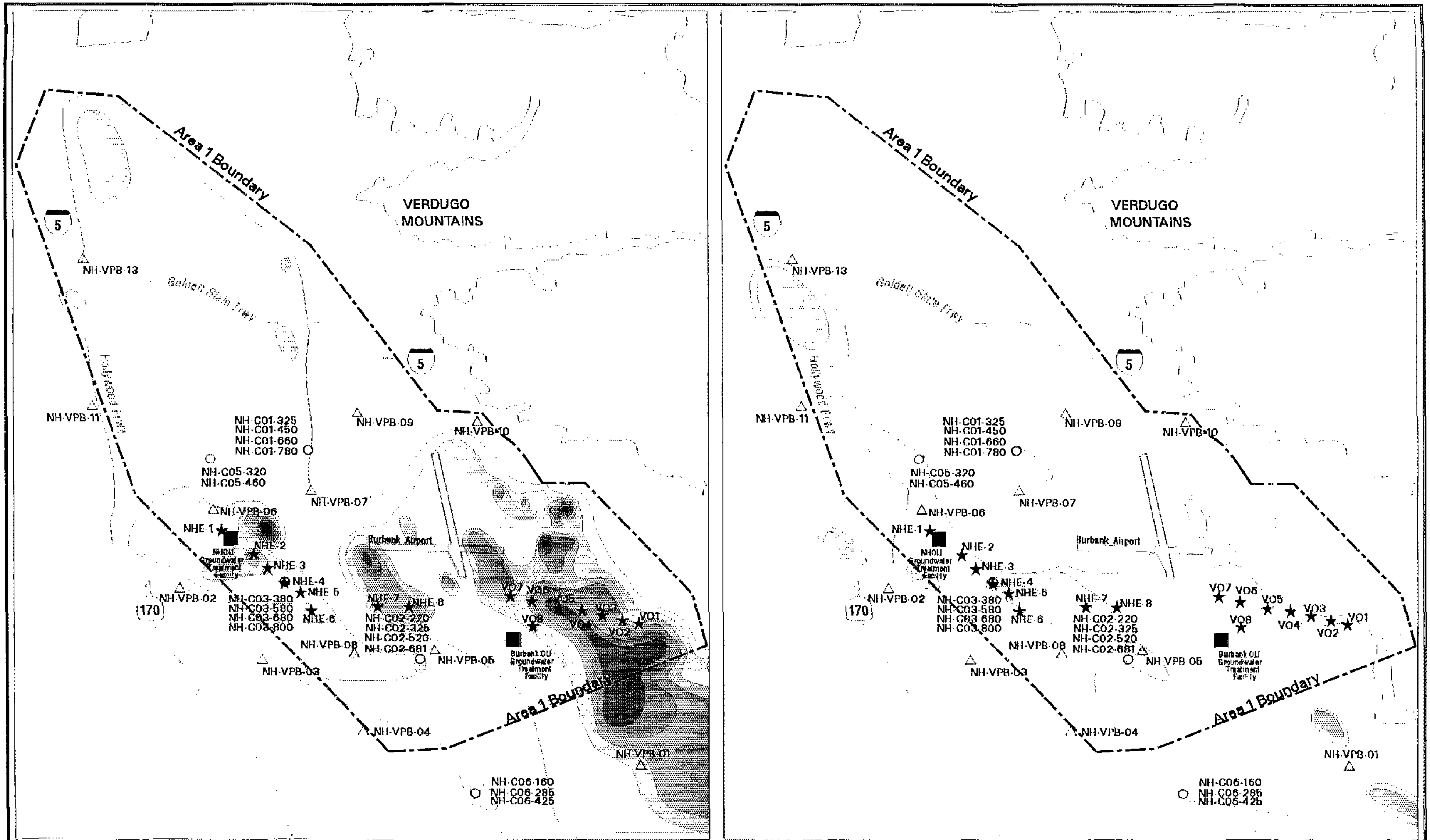

LEGEND:

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-4

TCE Concentration in Groundwater (µg/L), 2000

San Fernando Valley (Area 1)
Los Angeles County, California

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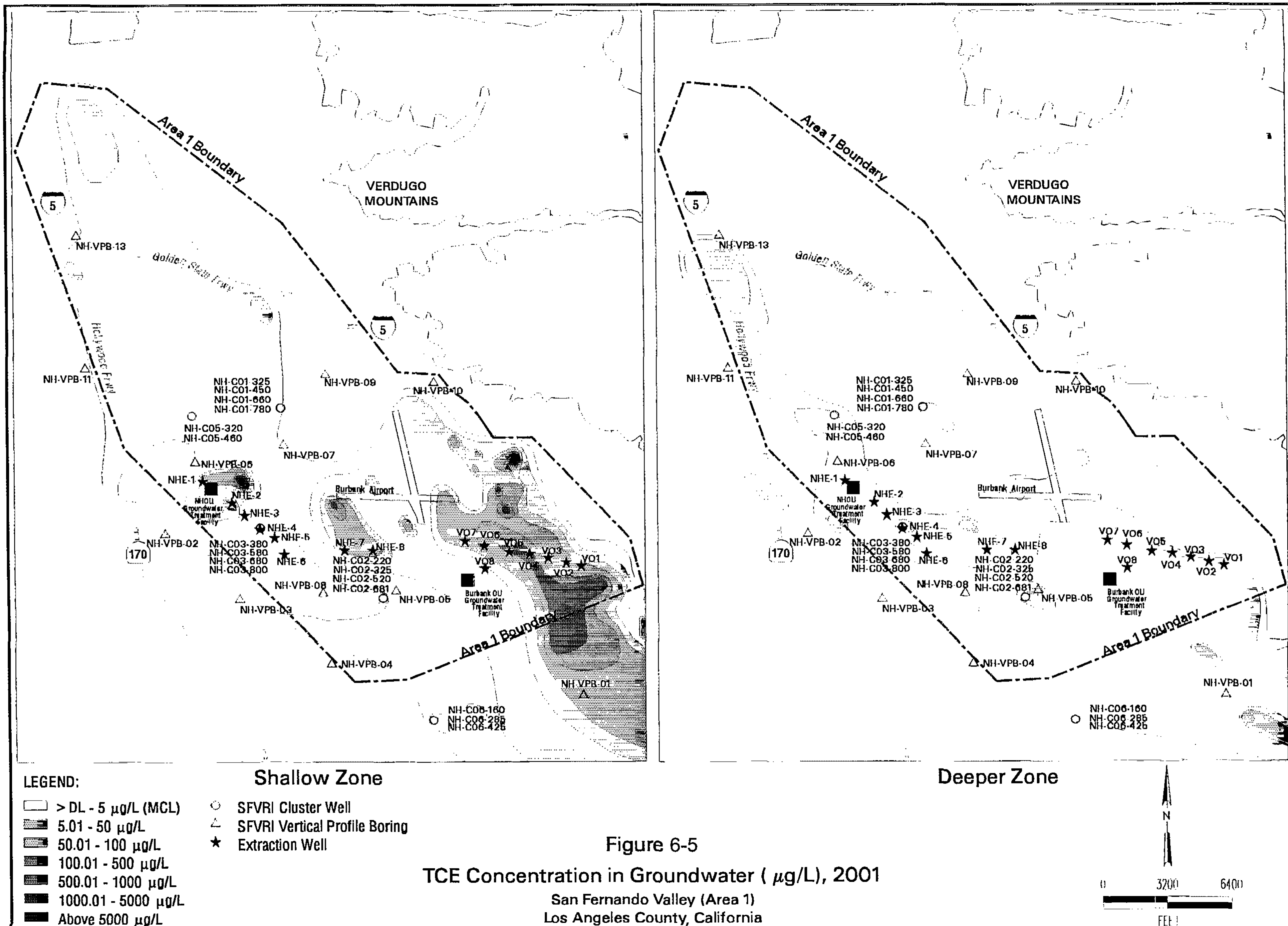

Figure 6-5

TCE Concentration in Groundwater (µg/L), 2001

San Fernando Valley (Area 1)

Los Angeles County, California

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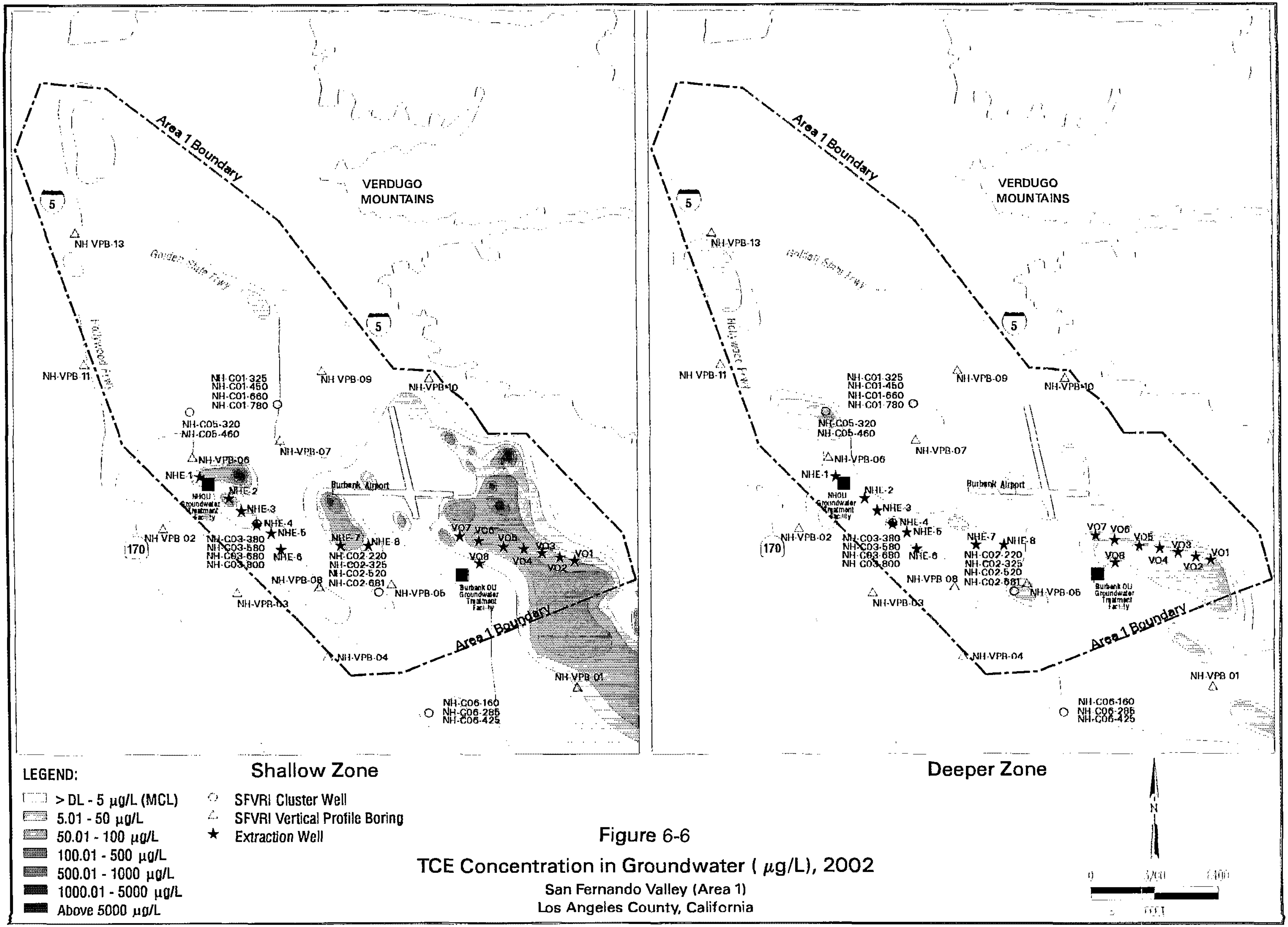

Figure 6-6

TCE Concentration in Groundwater (µg/L), 2002

San Fernando Valley (Area 1)

Los Angeles County, California

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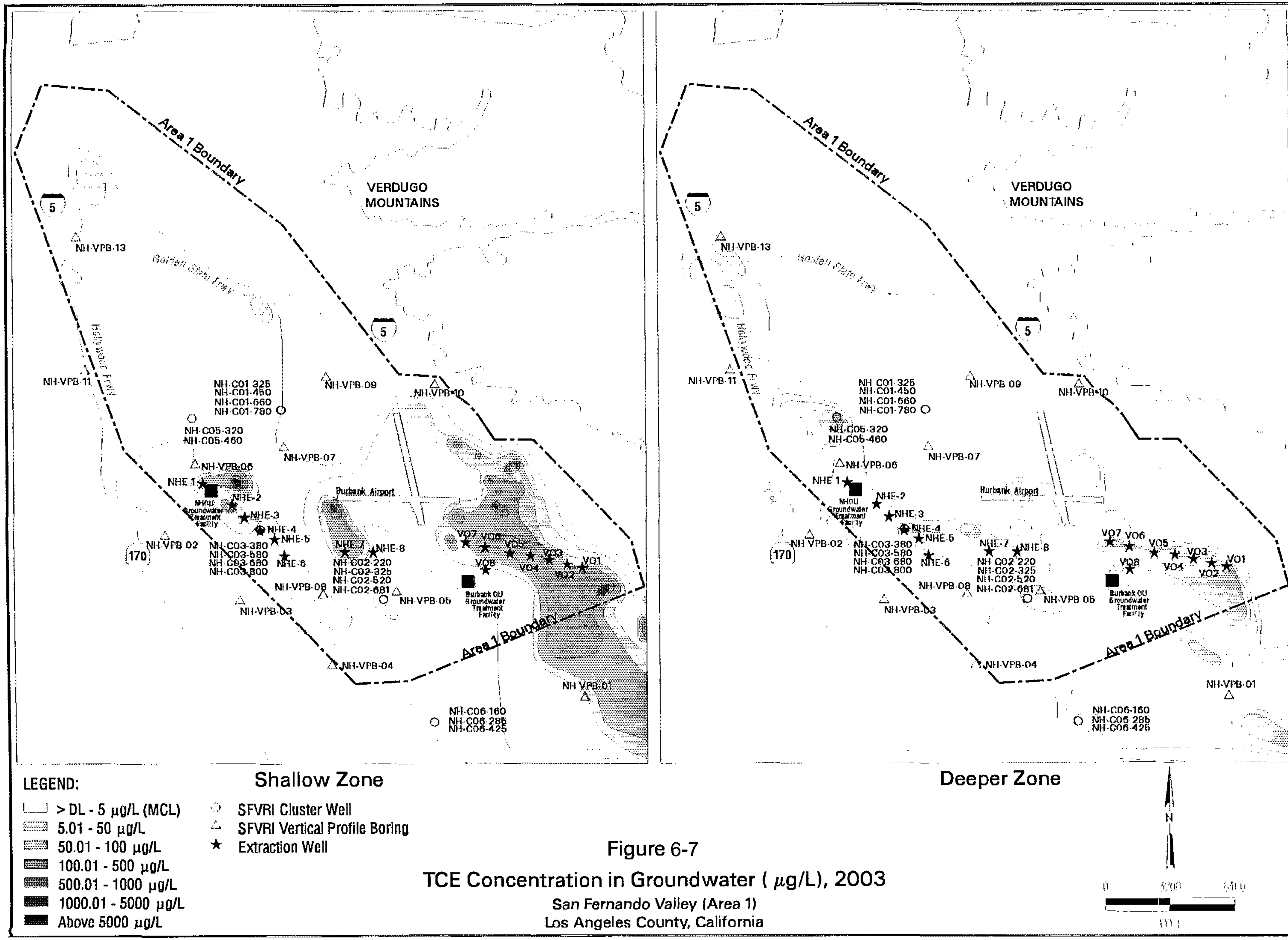

Figure 6-7

TCE Concentration in Groundwater (μg/L), 2003

San Fernando Valley (Area 1)

Los Angeles County, California

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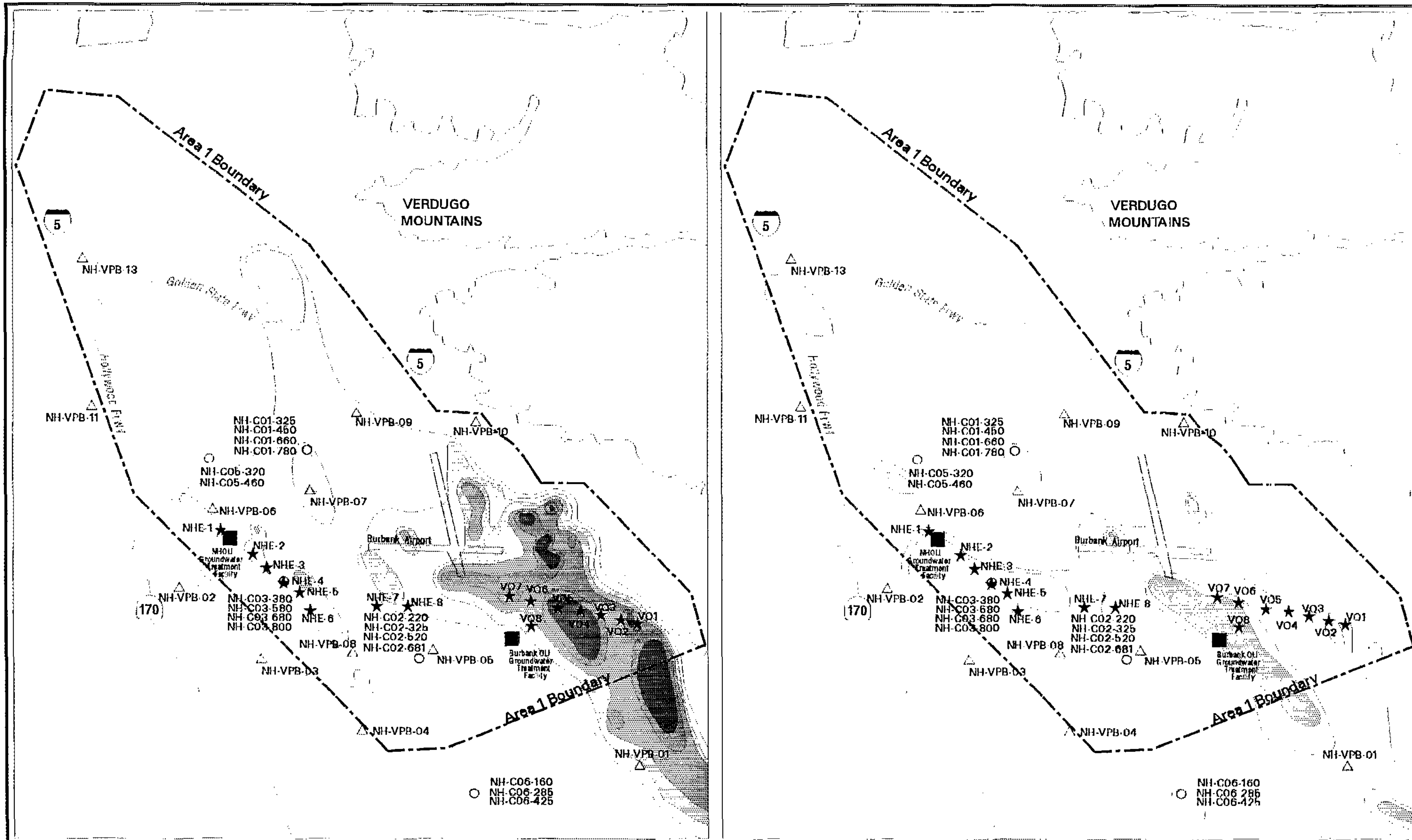

LEGEND:

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-8

PCE Concentration in Groundwater (µg/L), 1999

San Fernando Valley (Area 1)

Los Angeles County, California

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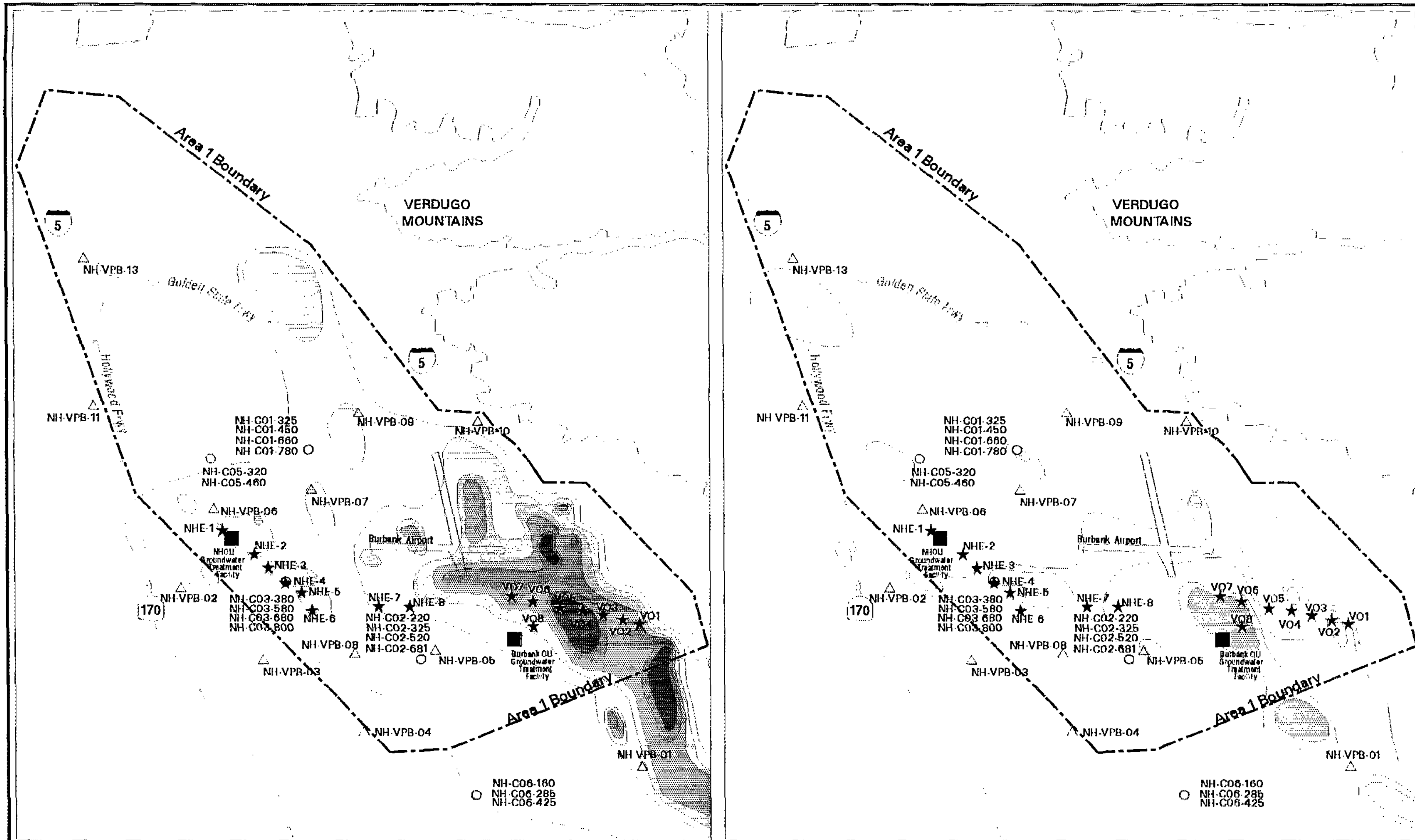

LEGEND:

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-9

PCE Concentration in Groundwater (µg/L), 2000

San Fernando Valley (Area 1)

Los Angeles County, California

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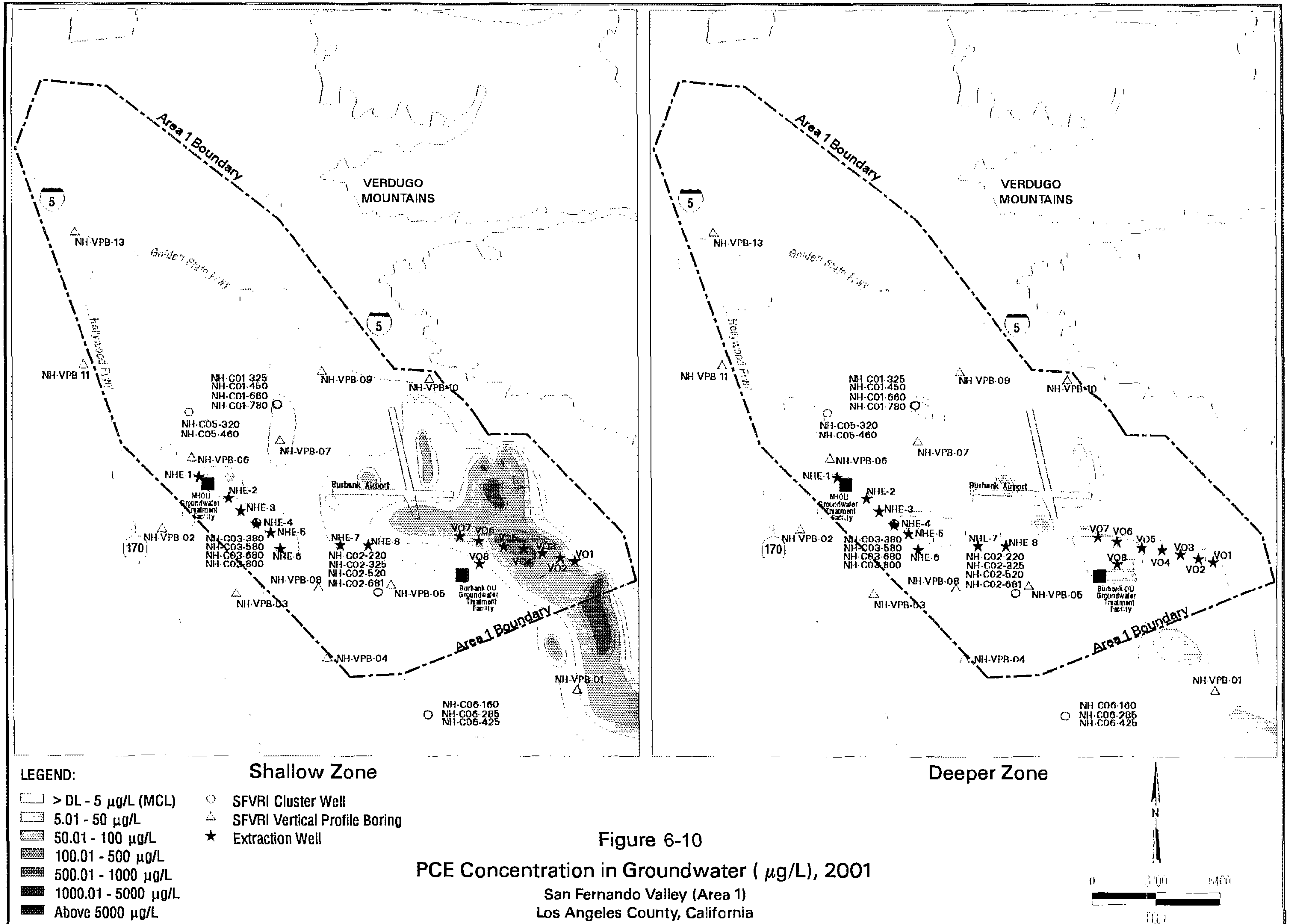

Figure 6-10

PCE Concentration in Groundwater (µg/L), 2001

San Fernando Valley (Area 1)

Los Angeles County, California

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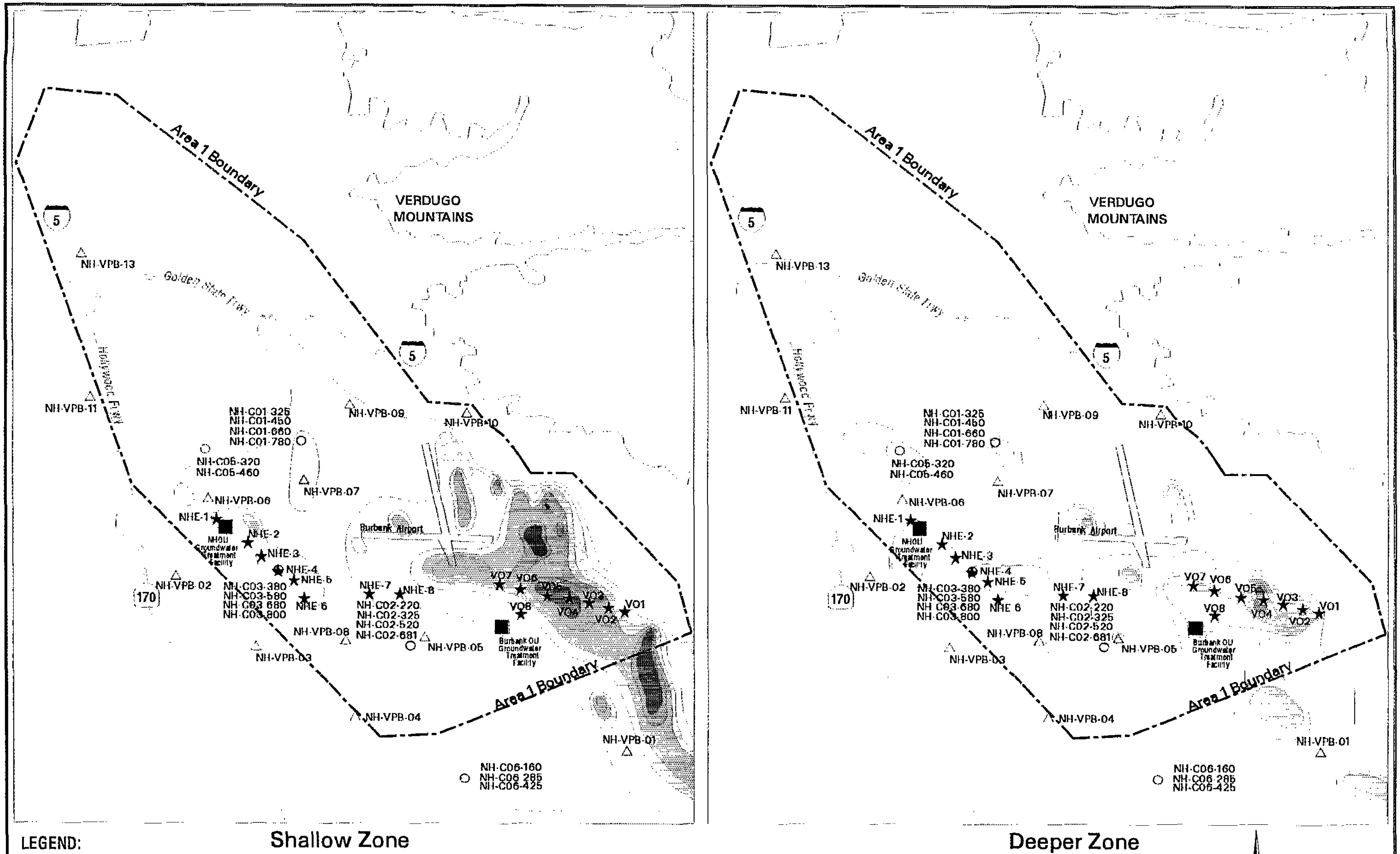

LEGEND:

- > DL - 5 μg/L (MCL)
- 5.01 - 50 μg/L
- 50.01 - 100 μg/L
- 100.01 - 500 μg/L
- 500.01 - 1000 μg/L
- 1000.01 - 5000 μg/L
- Above 5000 μg/L

- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-11

PCE Concentration in Groundwater (μg/L), 2002

San Fernando Valley (Area 1)

Los Angeles County, California

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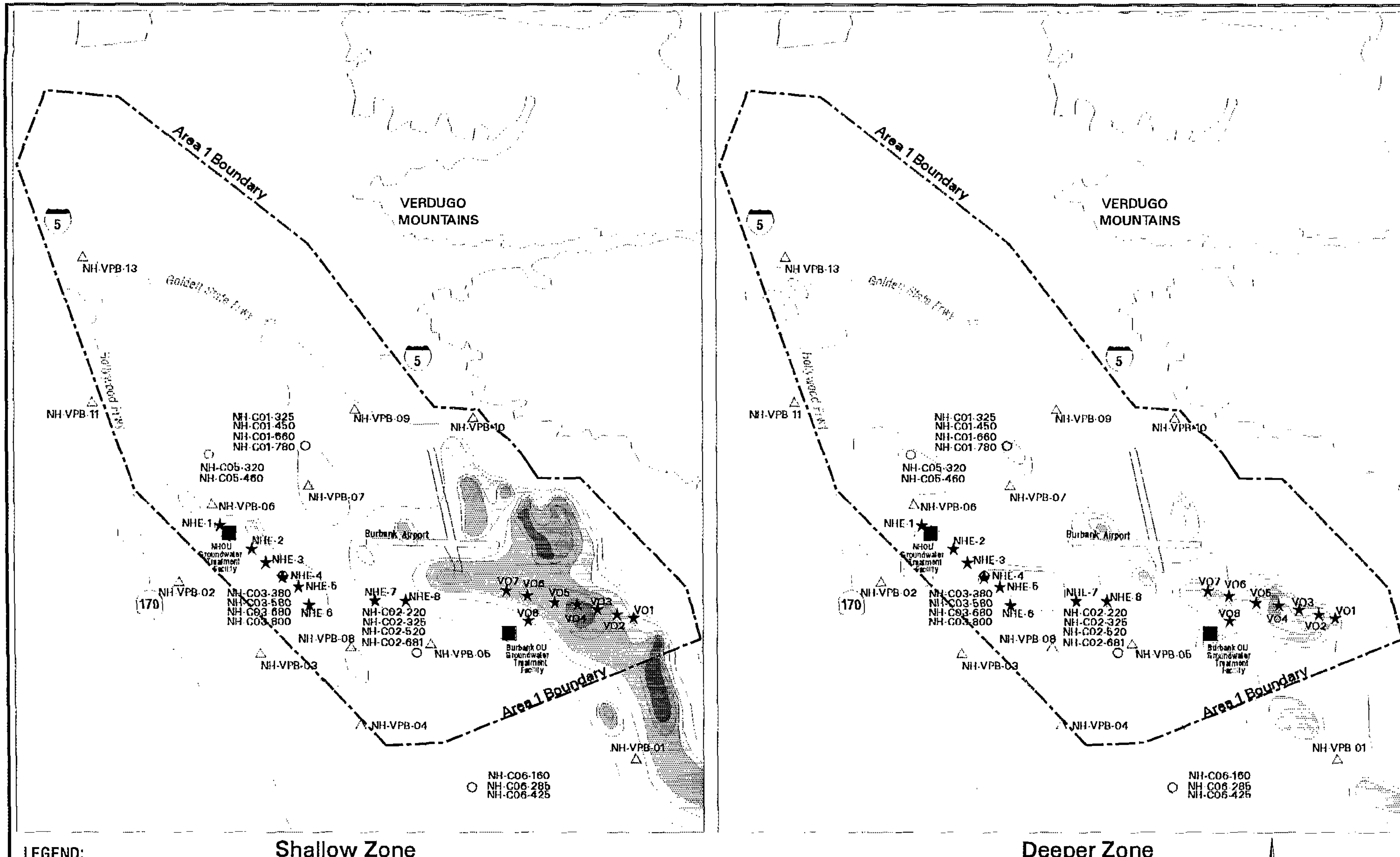

LEGEND:

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-12

PCE Concentration in Groundwater (µg/L), 2003

San Fernando Valley (Area 1)

Los Angeles County, California

\\cabernet\gis\projects\sfplume\area1_2004\plots\plotplume.aml
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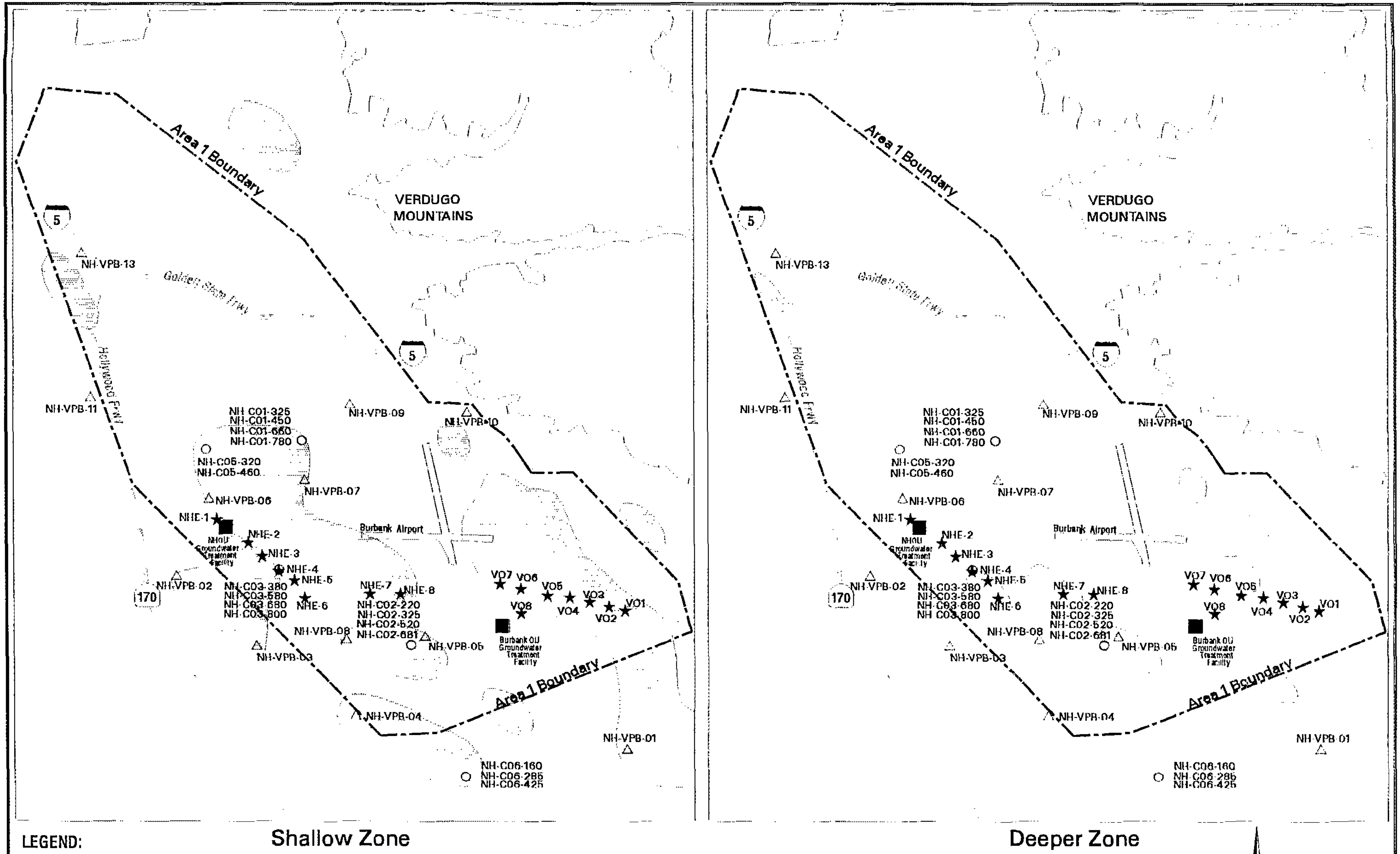

LEGEND:

- Above 45 mg/L (MCL)
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-13

Nitrate Concentration in Groundwater (mg/L), 1999

San Fernando Valley (Area 1)
Los Angeles County, California

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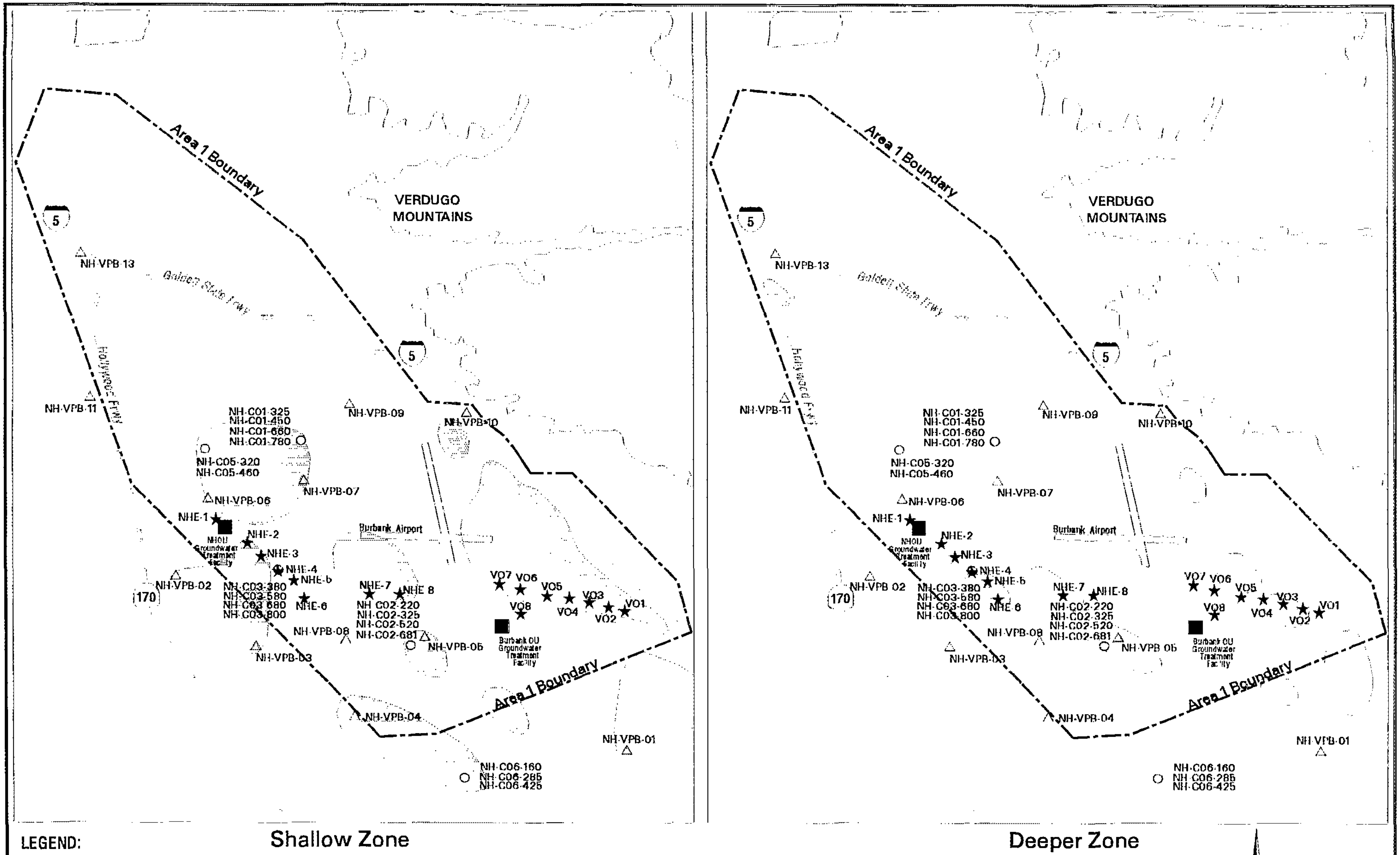

LEGEND:

- Above 45 mg/L (MCL)
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-14

Nitrate Concentration in Groundwater (mg/L), 2000

San Fernando Valley (Area 1)

Los Angeles County, California

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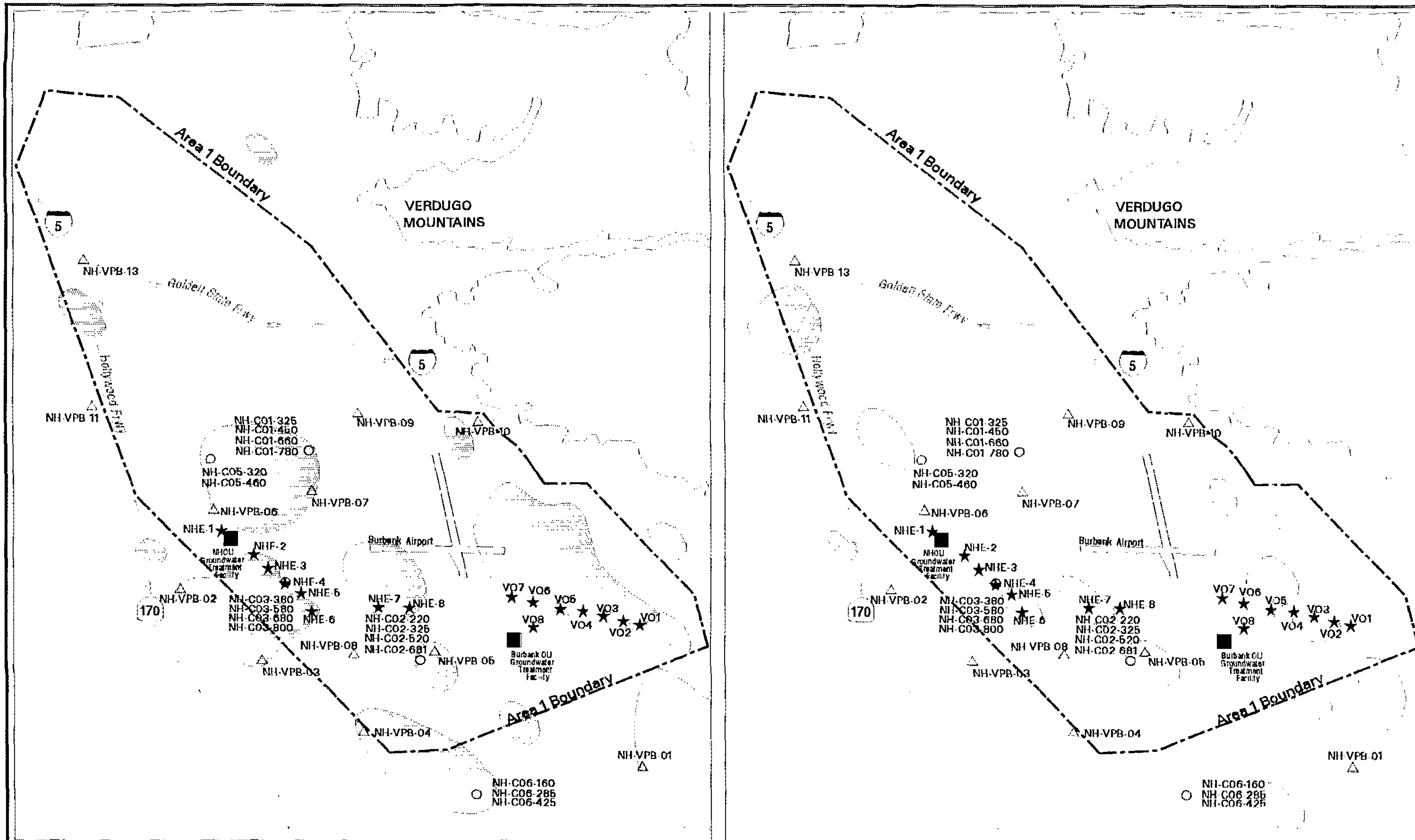

LEGEND:

- Above 45 mg/L (MCL)
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-15

Nitrate Concentration in Groundwater (mg/L), 2001

San Fernando Valley (Area 1)
Los Angeles County, California

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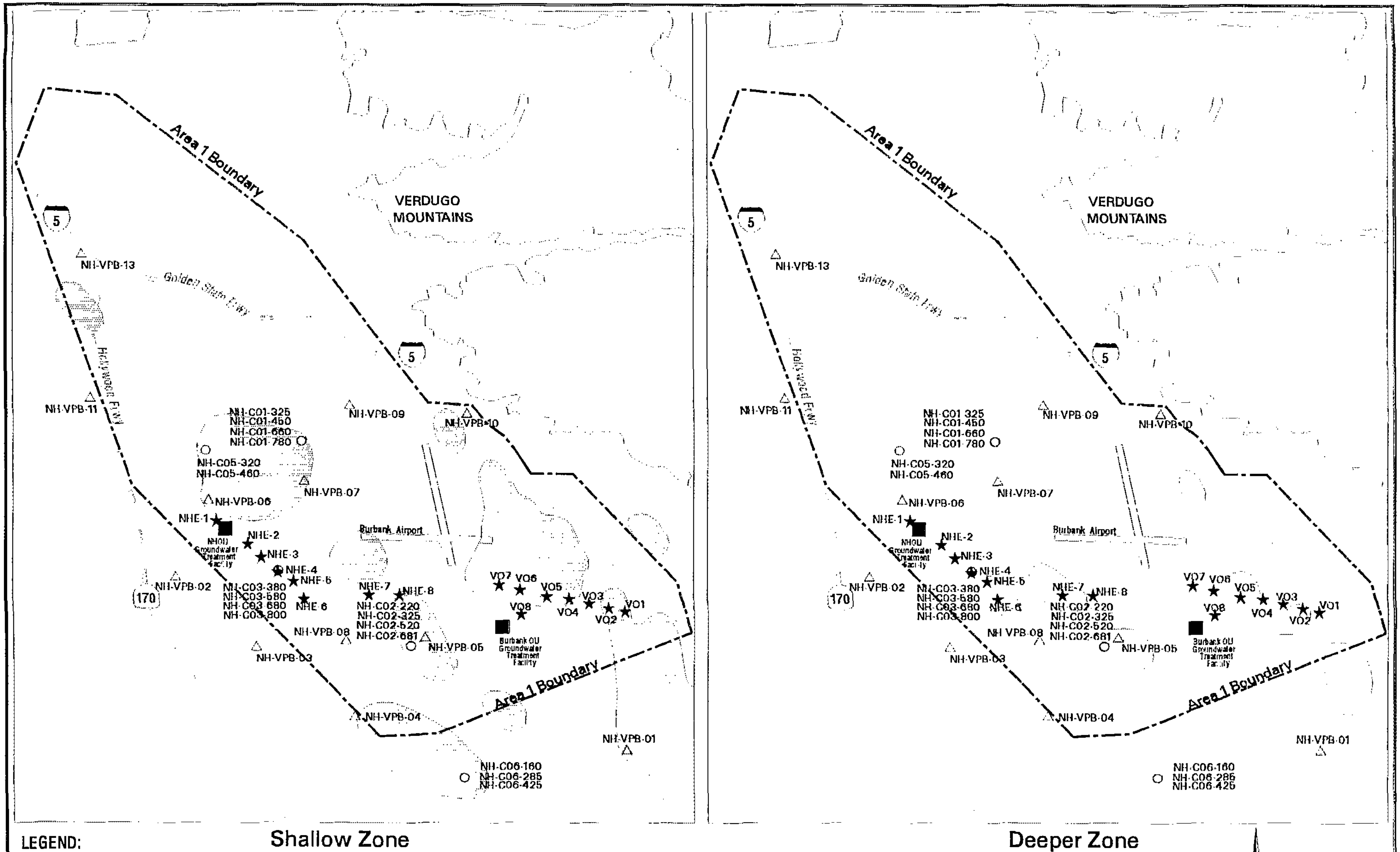


LEGEND:

- Above 45 mg/L (MCL)
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-16

Nitrate Concentration in Groundwater (mg/L), 2002

San Fernando Valley (Area 1)

Los Angeles County, California

//cabernet/gis/projects/sfplume/area1_2004/plots/plotplume.aml
05 Aug 04 22:25:58 Thursday

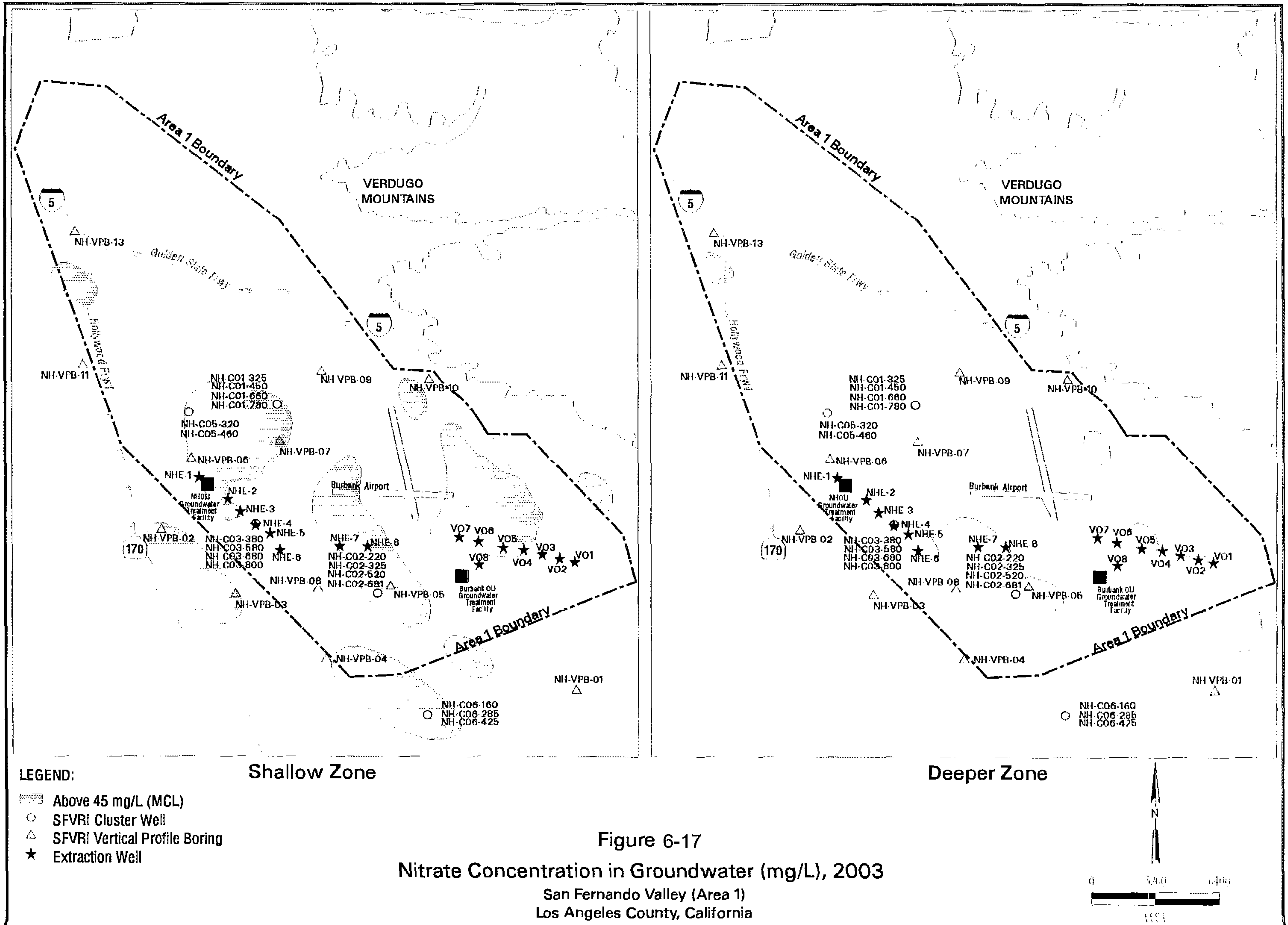


Figure 6-17

Nitrate Concentration in Groundwater (mg/L), 2003

San Fernando Valley (Area 1)

Los Angeles County, California

//cabernet/gis/projects/sfplume/area1_2004/plots/plotplume.aml
05 Aug 04 22:26:09 Thursday

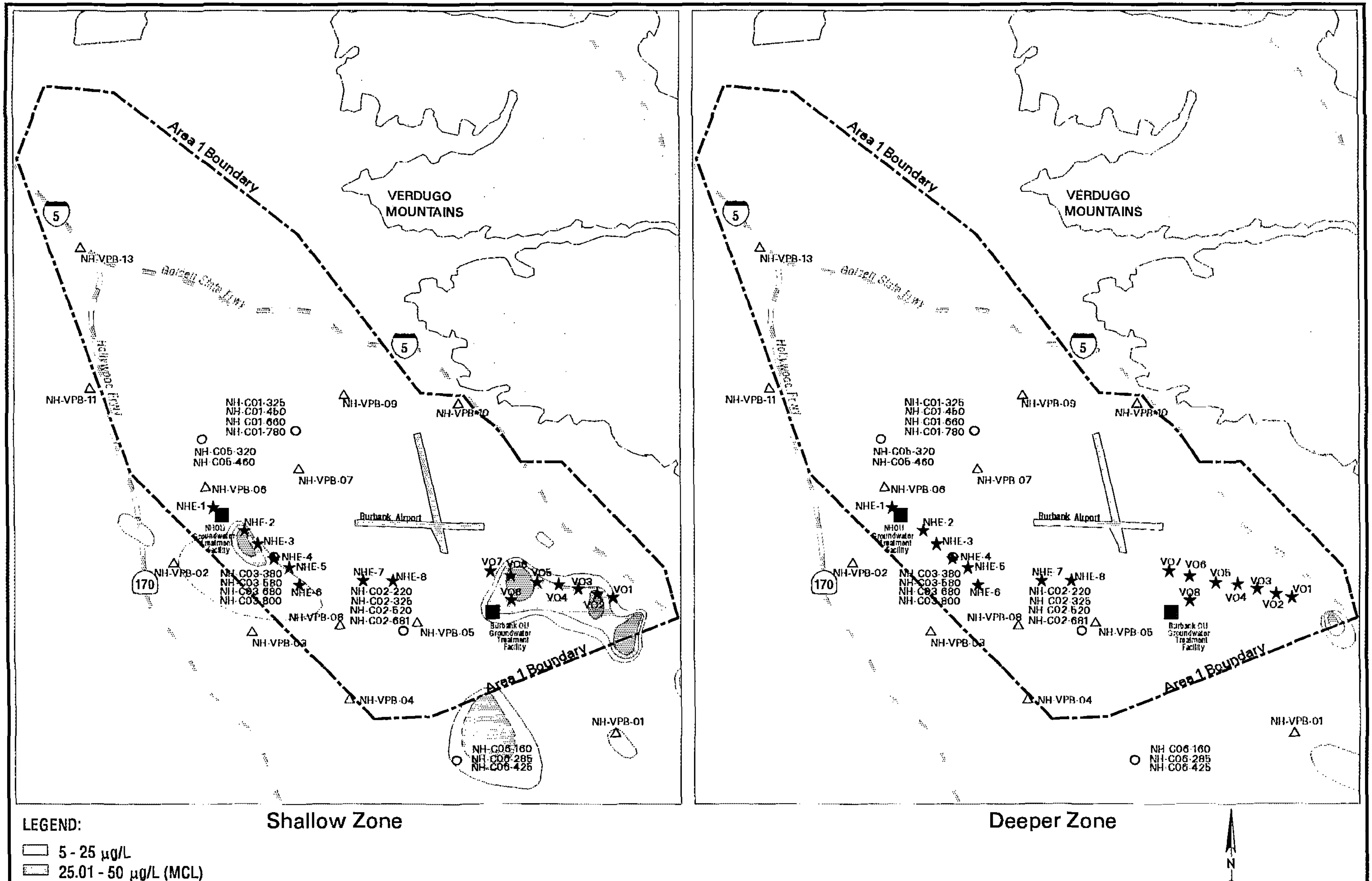


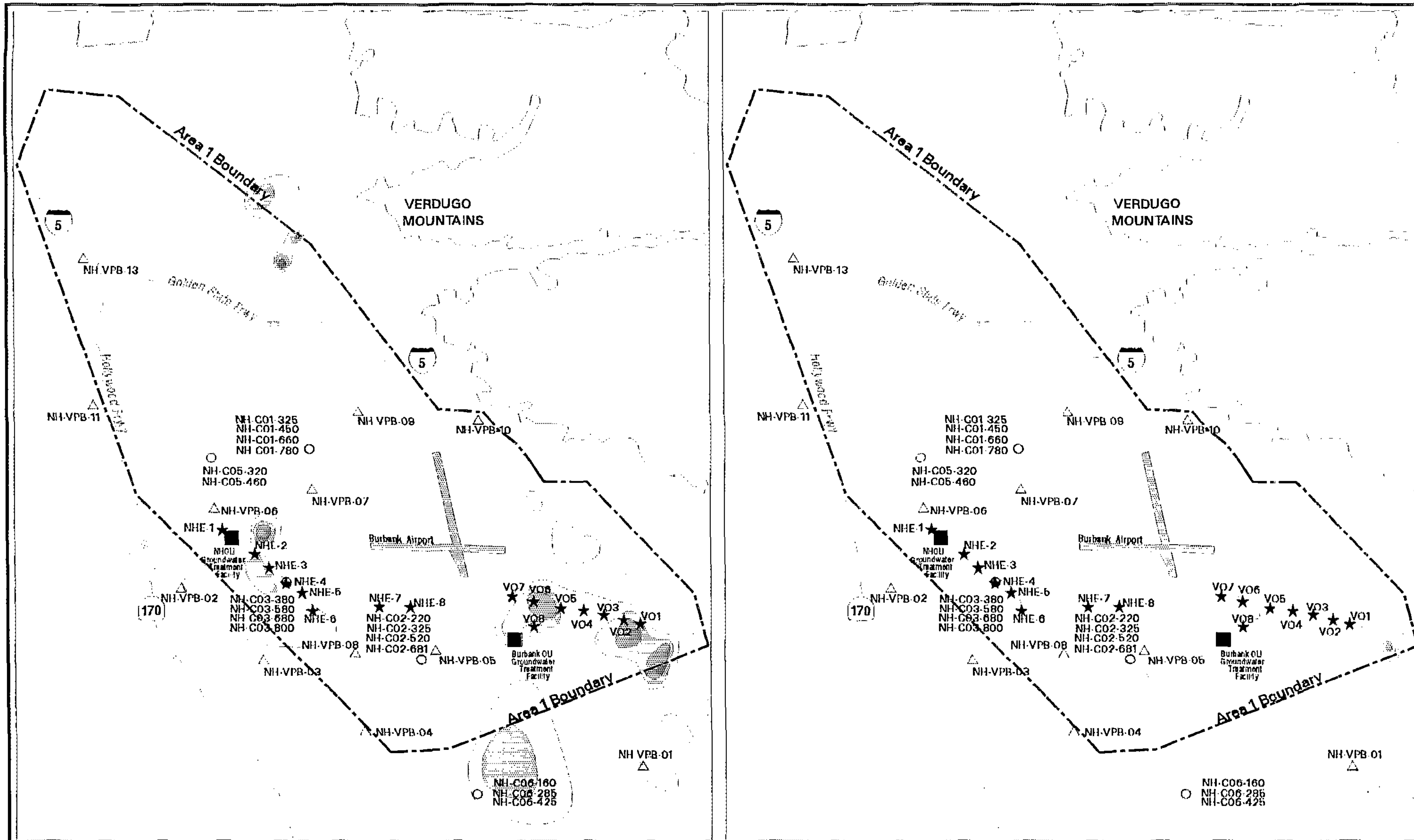
Figure 6-18

Total Dissolved Chromium Concentration in Groundwater (μg/L), 2001

San Fernando Valley (Area 1)

Los Angeles County, California

//cabernet/gis/projects/sfplume/area1_2004/plots/plotplume.aml
12 Aug 04 07:48:59 Thursday



LEGEND:

- 5 - 25 µg/L
- 25.01 - 50 µg/L (MCL)
- > 50 µg/L
- ○ SFVRI Cluster Well
- △ SFVRI Vertical Profile Boring
- ★ Extraction Well

Figure 6-19

Total Dissolved Chromium Concentration in Groundwater (µg/L), 2002

San Fernando Valley (Area 1)

Los Angeles County, California

//cabernet/gis/projects/sfplume/area1 2004/plots/plotplume.aml
05 Aug 04 22:26:51 Thursday

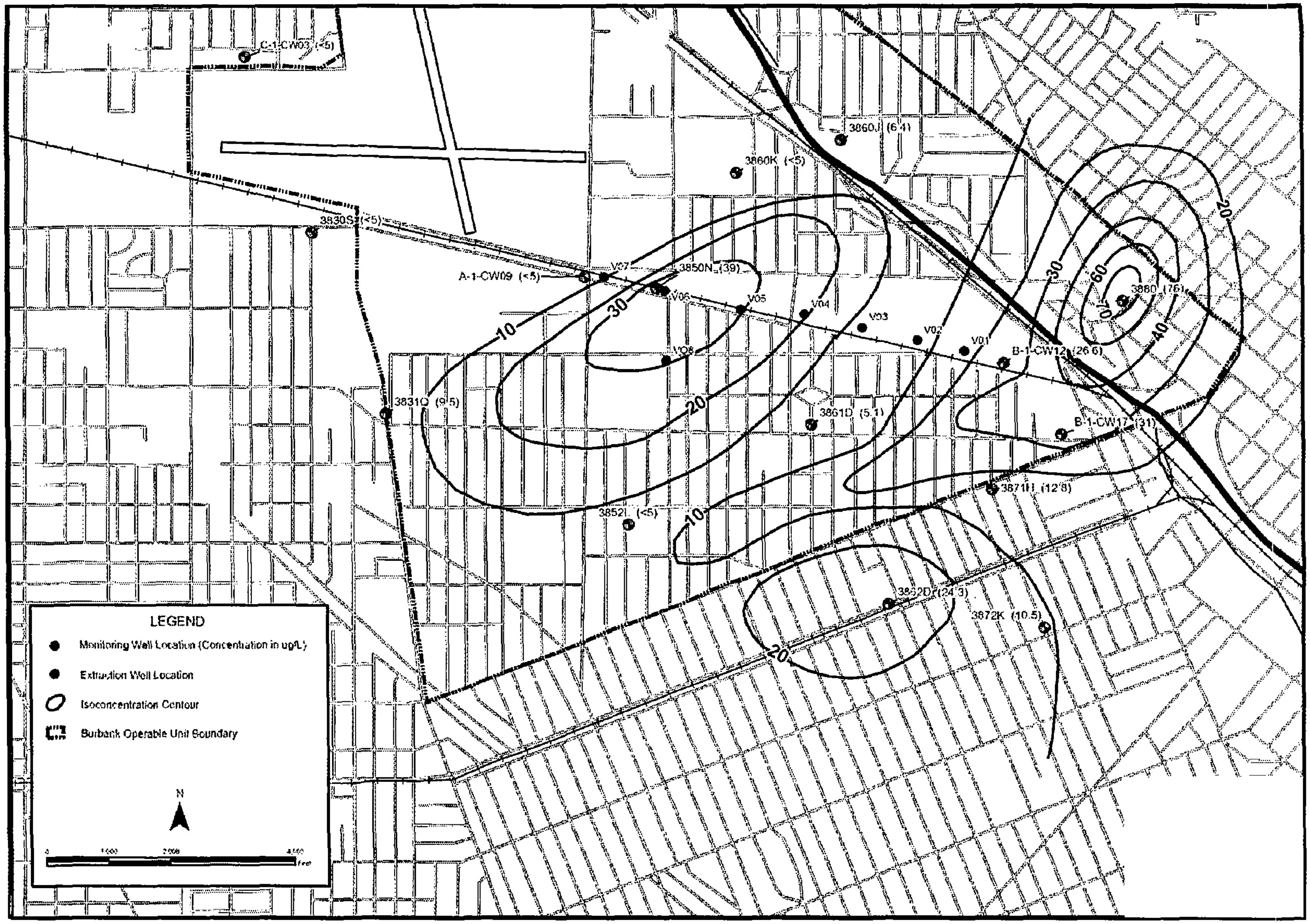


Figure 6-20a
Total Chromium Concentration in Water Table Zone Groundwater (µg/L), First Quarter 2004
Burbank Operable Unit
San Fernando Valley (Area 1)
Los Angeles County, California

Source: Tetra Tech, June 2004

CH2MHILL

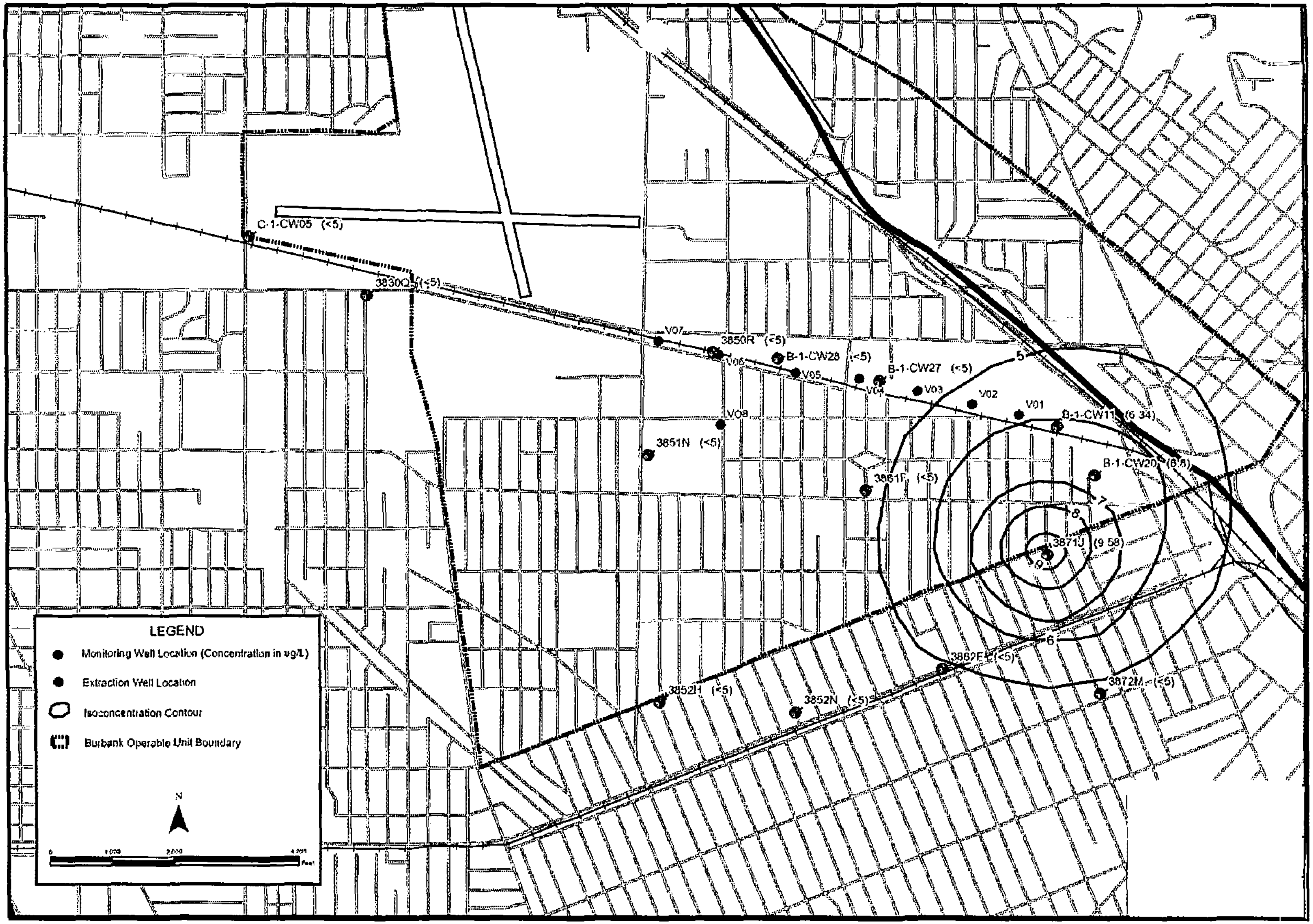


Figure 6-20b

Total Chromium Concentration in B-Zone Groundwater (μg/L), First Quarter 2004

Burbank Operable Unit

San Fernando Valley (Area 1)

Los Angeles County, California

Source: Tetra Tech, June 2004

CH2MHILL

7.0 Technical Assessment

This section evaluates the functioning of the remedy as intended, the current status of assumptions, and new information affecting the remedy.

7.1 Functioning of the Remedy as Intended by Decision Documents

The BOU groundwater treatment facility has provided water at the point of delivery that was below MCLs for all COCs and has achieved the treated water quality requirements specified in ESD #1 since startup in 1996. However, the treatment system has rarely operated at the 9,000-gpm design capacity. Historical groundwater data indicate lateral plume migration during an extended shut-down of the facility in 1998. Current groundwater data indicate vertical VOC plume migration. Generally, the BOU groundwater treatment facility has met all actual and substantive requirements of the DHS, NPDES, and SCAQMD permits.

Lower than expected extracted volume is attributed to O&M problems at the BOU which are currently being evaluated and addressed. These include:

1. Extraction well pump issues, including extended downtime due to maintenance issues and design constraints. Excessive well pump and controls related problems have attributed to a high loss of efficiency. In locations where water levels remain high at higher pumping rates, the extraction rate cannot be increased due to the capacity of some pumps. Additionally, the design of pumps in wells VO-1 through VO-7 causes instability. Specifically, these pumps are below ground and water cooled; therefore, a pump shroud was added. The shroud can increase air bubbles, causing instability in pump flow. This does not occur at VO-8 because the pump motor is above ground and air cooled, as are most production well pumps (CH2M HILL 2003). Over time, the well screens and packing material may have become fouled, thereby decreasing operational efficiency. This is being evaluated as part of the performance attainment study in 2004-2005

2. Unanticipated downtime due to 1,2,3-TCP breakthrough at LPGAC vessels has attributed to a loss in operational efficiency. Originally, the BOU treatment facility was designed to regenerate LPGAC on site. However, due to cost and operational issues, LPGAC is now regenerated off site. As per the *1,2,3-TCP Monitoring Plan* (City of Burbank 2000), when 1,2,3-TCP is detected at the third ¼-sampling port and verified, the vessel is removed from service. A replacement bed is ordered. Upon receipt it is soaked overnight to remove any air bubbles. The bed is then backwashed and placed in service. This process can take a minimum of 3 days or more, depending on vendor availability and whether servicing is required on the weekend. 1,2,3-TCP breakthrough may be due to carbon fines; therefore, the backwashing procedure should be improved to increase

adsorption reliability. Improving the LPGAC backwashing procedures is necessary to decrease downtime attributable to 1,2,3-TCP breakthrough.

3. VPGAC screen failure has contributed to production inefficiencies since 1999, when it was first noted. EPA is working with the City to resolve design issues. Completion of construction modification activities is planned for late 2004/early 2005.

4. Because of the presence of chromium in the wellfield at concentrations greater than the MCL and the fact that the BOU treatment facility is not capable of remediating chromium-impacted groundwater, the chromium blending plan was developed to ensure that influent from extraction well VO-1 is less than the State MCL for total chromium of 50 µg/L. This blending plan was implemented from 1999 to 2000 and successfully achieved the objective; however, it has resulted in decreased pumping from chromium impacted wells, such as VO-1. Decreased extraction rates from selected wells has influenced the ability to meet the 9,000 gpm goal. The treatment system is not capable of remediating chromium-impacted groundwater; therefore, given the current configuration, controlling extraction well pumping rates is the alternative to achieve the objective of producing water at concentrations less than the MCL.

The decision documents for the BOU stated that the treatment system was to meet substantive requirements of the NPDES permit. Backwashing of LPGAC beds due to carbon fines primarily occurs prior to placement of virgin carbon; however, sometimes backwash is conducted during mid-cycle use of the carbon. During recent discussions with the City, EPA learned that backwash water is discharged through bag house filters to the storm drain. As a result, this water is not sampled under the NDPES sampling procedure. Following discussions with EPA, the City has ceased discharging backwash water through bag house filters to the storm drain when carbon is in use and plans to sample backwash water. The sampling results will determine whether discharge limits have been met.

An evaluation of recent air emissions data indicates that concentrations are greater than those used in the 2000 maximum individual risk calculation to demonstrate substantive compliance with SCAQMD regulations. The BOU is located within 1,000 feet of the outer limits of a school; therefore, air emissions data should be reevaluated to determine continued compliance with SCAQMD regulations and, secondarily, VPGAC efficiency.

The remedy was designed to extract and treat groundwater from the shallow aquifer (A-zone) in order to capture the most contaminated groundwater for treatment. To achieve this, packers were installed in extraction wells VO-1 through VO-7 above the B-zone; however, the packer in well VO-8 is placed at the base of the B-zone. The May 2004 monthly report indicated that the packer in well VO-5 cannot hold a charge, requiring maintenance every other day. Furthermore, the 2003 groundwater monitoring report indicates that there is a cone of depression present in the B-zone in the vicinity of well VO-2 and has been consistently present since 2002. This data indicates that the packers may be leaking, therefore, an evaluation of the integrity of the packers is warranted. If the integrity is compromised, the hydraulic control of packers and the effects of 'leaking packers' on contaminant transport and plume capture should be further evaluated.

7.2 Current Validity of Assumptions Used During Remedy Selection

The assumptions made at the time of remedy selection are generally unchanged. However, as stated in ESD #1, the proposed State MCL for PCE was set at 5 µg/L. This new standard is higher than the 4 µg/L SAL cleanup goal set in the 1987 ROD and, therefore, does not compromise the protectiveness of the remedy. During this five-year review, the assumptions concerning COC exposure and toxicity data and changes in remedial action objectives were evaluated. No current or potential changes have been identified during this five-year review process.

7.3 Recent Information Affecting the Remedy

The presence of new contaminants and expansion of the VOC plume may affect the protectiveness of the remedy in the future. New contaminants present in BOU extraction wells at concentrations greater than MCLs or SALs include total chromium and 1,2,3-TCP. Hexavalent chromium is also present in the BOU groundwater. However, there is no MCL nor SAL associated with this potential COC; therefore the State MCL for total chromium is used.

Nitrate contamination originated from historical agricultural practices and private sewage disposal (ULARA 2003a). To reduce the source of nitrates, a sanitary sewer construction program for 18 areas within the SFV was established and, as of 1999, six of the 18 areas still required upgrade (ULARA 2003a). Nitrate is a possible COC due to the potential ingestion risk to infants that could result in methemoglobinemia (cyanosis or blue-baby syndrome). The BOU remedy is not capable of remediating nitrate-contaminated groundwater. Currently, extracted and treated groundwater is blended to decrease nitrate concentrations to less than the MCL as required by the EPA Consent Decree and not to exceed 36 mg/L per the DHS permit. If the concentration of nitrates increases in the BOU area, the remedial action integrity may be compromised due to blending requirements to reduce nitrate concentrations below the MCL. However, monitoring data indicate that the concentrations have remained relatively consistent since 1999.

In 2000, prior to redevelopment of the Plan B-1 area, Lockheed Martin performed a soil removal action of chromium-impacted soil in the vicinity of the BOU. The current EPA MCL for total chromium is 100 µg/L. The current State of California MCL for total chromium is 50 µg/L. A revised State MCL for total chromium and a new State MCL for hexavalent chromium were due January 2004; however, a delay in a revised public health goal from OEHHA is delaying the establishment of the MCL. The treatment system was not designed to treat chromium-impacted groundwater. If the new DHS MCLs are low, the remedy may not be able to continue operating using the current facility. Measures should be taken to improve plume containment, and efforts should continue to address sources to avoid potential impacts to additional production wells.

1,2,3-TCP is a VOC used as a solvent, extracting agent, and degreasing agent. 1,2,3-TCP is a potential human carcinogen, shown to cause cancer in animals. Chemical properties of 1,2,3-TCP include slight solubility in water, very low soil sorption coefficient, heavier than water, and not readily degraded. In 1999, DHS established a SAL of 0.005 µg/L. Methods to achieve a detection limit equal to or less than the SAL are expensive and require an experienced analyst. 1,2,3-TCP was first detected in plant effluent in June 2000 at a concentration greater than the SAL. 1,2,3-TCP contamination resulting in LPGAC breakthrough is currently contributing to decreased production from the BOU treatment system. LPGAC modifications were completed in 2003; however, preliminary evaluation suggests that these modifications were not completely successful in solving the breakthrough problem. EPA and the City are working together to further evaluate this issue to increase the efficiency and production of the BOU.

As discussed in Section 6.3.1, a portion of the VOC plume migrated southeast of the BOU during the 1998 shutdown. Since then, the treatment system has operated regularly, with down time attributed to O&M issues. The lateral boundaries of the VOC plume have remained relatively stable. However, the groundwater monitoring chemical and hydraulic data suggest that vertical migration of TCE and PCE plumes are occurring.

8.0 Issues and Recommendations

Issues identified during the five-year review process primarily relate to the requirements in the 1998 Consent Decree that mandated the BOU treatment system pump average of 9,000 gpm of water. Additionally, the impacts of 1,2,3-TCP and other potential emerging contaminants on the efficiency of the BOU should be addressed. Vertical migration of TCE and PCE in the BOU should be evaluated. In terms of operations, demonstrating ongoing compliance with the substantive requirements of the NPDES backwash discharge water and SCAQMD air emission is recommended. Future potential uses of the aquifer are also addressed. This section discusses each issue and provides recommendations for improvement.

Issue

The treatment system has rarely operated at the 9,000-gallons per minute (gpm) capacity, as mandated in the second Consent Decree.

Recommendations

1. Proceed with the performance attainment study, as planned for 2004-2005, to evaluate and identify alternatives for increasing the continuous flow rate to meet the 9,000 gpm capacity goal, including evaluation of the well field mechanics and hydraulic delivery system.
2. Evaluate and modify, where needed, O&M practices that influence system downtime. For example, evaluate changes in the programmable logic controller necessary to avoid stripper shutdown and reduce surging due to well discharge valve cycling.
3. Periodically evaluate wellfield mechanics, hydraulic capacity, and the pumping plan to ensure capture of the plume and contaminant mass removal.

Issue

The emergence of new COCs such as chromium and 1,2,3-TCP, in plant effluent samples, and premature LPGAC breakthrough have caused decreased overall pumping rates and caused a reliance on well blending to decrease concentrations. For total chromium, the well blending is utilized to decrease the concentration to 10 μg/L or less at the air stripper influent.

Recommendation

1. Continue to evaluate and address 1,2,3-TCP breakthrough from both a mechanical and chemical perspective. Specifically, backwash procedures, the presence of carbon fines, and the potential for chemical interactions influencing the preferential adsorption, as previously identified.
2. Evaluate and revise chromium and 1,2,3-TCP blending and pumping plans by November 30, 2004. Conduct annual evaluations thereafter.

3. The City of Burbank should submit a pumping plan, indicating how the flow rates for each of the BOU extraction wells will be managed to meet the MCL for total chromium and the SAL for 1,2,3-TCP for EPA's review and approval, by November 30, 2004.

Issue

Recent groundwater data indicate increasing concentrations of VOCs in the B-zone and a hydraulic influence in the vicinity of the BOU treatment system. Concentrations in the B-zone are substantially less than the A-zone, therefore pumping from this zone is not the most efficient way to capture the high concentration mass of VOCs in the BOU area. Well packers may be leaking, allowing for downward migration of contamination.

Recommendations

1. Ensure all packers are operating as intended. Identify any maintenance issues and repair promptly as needed.
2. As a part of the performance attainment study, include methods for evaluating vertical migration.

Issue

Should the City of Burbank resume pumping their current wellfield or install new wells in the vicinity, there could be effects on plume migration and capture within the BOU. The hydraulic influence of pumping of nearby production wellfields can be seen throughout Area 1.

Recommendation

1. An institutional control should be put in place to ensure that planned groundwater activities in the vicinity of the BOU do not decrease the performance of the treatment plant without a thorough evaluation by EPA.
2. Because of adjudicated water rights groundwater extraction and spreading within the SFV is monitored by the ULARA Watermaster. Public water supply purveyors in the SFV are subject to DHS oversight which includes evaluation of proposed new sources, reporting of current drinking water sources (condition and amounts), and vulnerability assessments. The ULARA Watermaster and DHS should provide annual updates to EPA of the activities within the BOU hydraulic area of influence.

Issue

Recent air emissions data measured at VPGAC units is much greater than the 2000 data used to calculate maximum individual cancer risk. Additionally, the BOU is located within 1000 feet of the outer limits of a school; therefore the risk associated with air emissions should be reevaluated in terms of SCAQMD regulations.

Recommendation

1. Evaluate the maximum individual cancer risk for BOU receptors based on recent air emissions data in accordance with SCAQMD regulations; implement air modeling and corrective measures as needed.

2. Continue to report quarterly air emissions data in reports submitted to EPA.

3. Currently carbon is regenerated every 10 days. This will be reduced to every 8 days (as of September 2004).

4. Conduct an air monitoring test consisting of collecting air emissions samples daily during the 8 day cycle to determine if the carbon regeneration cycle needs to be reduced even further (by October 30, 2004).

Issue

NPDES sampling is not comprehensive as it does not include handling and disposal of backwash water. The City of Burbank prepares and submits NPDES sampling results, however the reports do not include a comparison to acceptable discharge limits.

Recommendations

1. Proceed with collecting and analyzing backwash samples as per EPA request.

2. Cease discharging backwash water through bag filters to the storm drain until results are available, particularly backwash water generated once the carbon bed has been in use.

3. Modify and document backwash water handling procedures as needed to ensure discharge under NPDES is in compliance. Provide training to plant operations staff on new procedures

4. Continue to include NPDES monthly sampling data in a table format which shows results compared to the allowable discharge limits, in the monthly reports submitted to EPA.

Issue

Emerging contaminants such as 1,2,3-TCP and chromium have influenced operational efficiency at the BOU. The BOU treatment system is capable of remediating 1,2,3-TCP impacted groundwater; however because of the low SAL, breakthrough at the LPGAC is premature and sometimes unpredictable. The BOU treatment system is not designed to remediate chromium. Ongoing monitoring of upgradient wells for potential new COCs should continue to allow for effective management and continued operations of the BOU treatment system.

Recommendation

1. Continue to monitor wells upgradient of the BOU for known emerging contaminants

2. Evaluate spatial distribution and concentration with respect to the BOU extraction well network semi-annually.

3. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be performed.

These issues, recommendations and follow-up actions are summarized in the following table (Table 8-1).

TABLE 8-1
Summary Table-Issues, Recommendations and Follow-Up Actions
Burbank Operable Unit, San Fernando Valley Superfund Site
Los Angeles County, California

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
BOU treatment system is not meeting 9,000 gpm goal	a) Proceed with performance attainment study b) Evaluate, and modify where needed O&M practices that influence system downtime. c) Periodically evaluate wellfield mechanics, hydraulic capacity, and the pumping plan.	City of Burbank	USEPA	a)2004 – Winter 2005 b) Winter 2005 c) 2005, annually thereafter	N	Y
Well pumping rates are influenced by the presence of emergent chemicals (chromium and 1,2,3-TCP)	a) Evaluate and address 1,2,3-TCP breakthrough b) Evaluate and revise chromium and 1,2,3-TCP blending and pumping plans. c) Submit a pumping plan indicating how the flow rates for each BOU extraction well will be managed to meet the MCL/SAL.	City of Burbank	USEPA	a) 2005, ongoing b) 2004-2005; annually c) November 30, 2004	N	N
Increasing concentrations of VOCs in B-zone wells; well packers maybe leaking	a) Ensure all packers are operating as intended. b) As a part of the performance attainment study, include methods for evaluating vertical migration.	City of Burbank	USEPA	a) 2004 - 2005 b) Winter 2005	N	Y
Should the City of Burbank resume pumping wellfields in the area of the BOU in the future, there could effects on plume migration	a) Institutional control to ensure that planned groundwater activities do not decrease the performance of the BOU treatment system. b) Annual updates from the ULARA and DHS to EPA regarding pumping and spreading activities in the vicinity of the BOU.	a) City of Burbank b) ULARA Watermaster, DHS	USEPA	a) 2005 b) 2005 and annually	N	Y

TABLE 8-1
Summary Table-Issues, Recommendations and Follow-Up Actions
Burbank Operable Unit, San Fernando Valley Superfund Site
Los Angeles County, California

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N) Current	Affects Protectiveness (Y/N) Future
Recent air emissions data is much greater than that used in the 2000 SCAQMD risk evaluation	a) evaluate the maximum individual cancer risk based on recent air emissions data b) continue to report quarterly air emissions data c) Reduce carbon changeout to every 8 days d) Conduct additional air monitoring	a, b, c) City of Burbank d) USEPA	USEPA	a) 2005 b) quarterly c) Sept. 2004 d) Nov. 2004	Y	Y
NPDES sampling is not comprehensive	a) Collect and analyze backwash samples b) Cease discharging backwash water to the storm drain until sampling results are evaluated. c) Modify and document backwash water handling procedures. d) Compare NPDES sampling data presented in monthly reports with allowable discharge limits.	City of Burbank	USEPA	a) 2005, at next backwash b) Sept. 2004 c) Oct. 2004 d) Monthly, ongoing	Y	N
Management of emerging contaminants	a) Monitor upgradient wells for emerging contaminants b) Evaluate spatial distribution and concentration of emergent contaminants with respect to the BOU c) Periodic review of emergent chemicals and their MCLs.	a) EPA, Lockheed Martin b) Lockheed Martin c) EPA	USEPA	a) Quarterly, ongoing b) Semi-annually, ongoing c) Annually, 2005	Y	N

9.0 Protectiveness Statement

The assessment of this five-year review found that the interim remedy for the BOU was constructed in accordance with the ROD and ESDs and is currently protective of human health and the environment; the concentrations of TCE and PCE in BOU treatment system effluent are less than regulatory cleanup goals. Additionally, the concentration of nitrate in treated groundwater after the blending point is less than regulatory cleanup goals and no other potential constituents of concern currently exceed health-based standards in water from the blendpoint. While current air emissions may be within EPA's risk range of 10^{-4} to 10^{-6}, an air emissions evaluation will need to be conducted in order to determine air protectiveness at the BOU. The findings of this review and the NHOU five-year review, which was completed in September 2003, both concluded that VOC plume containment should be evaluated and addressed to ensure continued protectiveness. In addition, the City of Burbank should continue ongoing sampling and reporting of extraction well concentrations of emerging contaminants, such as 1,2,3-TCP (weekly), total chromium (monthly), hexavalent chromium, 1,4-dioxane (weekly), and perchlorate (annually)—COCs not previously identified for treatment in EPA decision documents. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated maximum contaminant levels or risk-based treatment standards should be performed.

In the future, protectiveness determinations will be made for Area 1 (BOU and NHOU) together as a whole. The next five-year review for Area 1 will be conducted on or before September 2009.

10.0 Next Review

The next comprehensive five-year review for Area 1 (BOU and NHOU) will be conducted on or before September 2009.

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Appendix A
Documents Reviewed

APPENDIX A

Documents Reviewed

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Appendix B
Rationale for Selection of Representative Monitoring Well Data

Appendix B
Rationale for Selection of Representative Monitoring Well Data

Water quality data received from U.S. Environmental Protection Agency (EPA) Remedial Investigation (RI) monitoring wells, California Regional Water Quality Control Board (RWQCB) facility wells, California Department of Toxic Substances Control (DTSC) facility wells, Lockheed Aeronautical Systems Corporation (LASC)monitoring wells and production wells operated by purveyors in the SFV (Los Angeles Department of Water and Power, the Cities of Glendale and Burbank, and Crescenta Valley County Water District) are incorporated into the SFV Geographic Information System (GIS) database. For EPA RI monitoring wells, facility wells, and production wells incorporated in the SFV GIS, the areas of contamination are based on the available representative data. A set of steps has been developed to incorporate all available data in a logical method understanding the varying sampling schedules and requirements. This rationale incorporates all recent available data while retaining "older" data. The convention established for accomplishing this goal, while adequately and accurately presenting the available data in the SFV GIS database, is based upon the following set of criteria.

- For those wells sampled on a routine quarterly basis (i.e., RI and LASC monitoring wells); the highest concentration value observed during the previous 6 months (i.e., previous 2 sample rounds) should be used on the maps.
- For wells that are sampled on an annual basis, the highest concentration value observed during the previous two sample rounds should be used on the maps.
- For wells not sampled within the last year but within the previous 18 months, the highest concentration value observed during the previous 18 months should be used on the maps.
- For wells where the most recent data is from more than 18 months prior to the current sampling, the most recent concentration value available should be used on the maps.
- For wells where the most recent data is from 5 years (or more) prior to the current sampling, the data is retained at its latest know value until a more recent replacement value is obtained. These older data points are presented on the concentration contour maps with a different well symbol.

For RWQCB facility wells, additional steps are included in the selection criteria. These steps are necessary because there are additional water quality and well construction data found in "hard copy" reports compared to the reports received in electronic format. For these quarterly data, the following steps are completed prior to the above stated criteria.

- Manual review of "hard copy" reports; entry of those data not included with the current electronic data into a separate file along with a flag.

- Review of this flagged data as subsequent electronic data reports are received. Electronic data corresponding to the flagged data should replace those data in the SFV GIS; additional data observed in subsequent review of "hard copy" reports and not received in electronic form should be entered into the separate flagged file.

Appendix C
Five-year Review Site Inspection Checklist and Interview Summary Forms

APPENDIX C

Five-year Review Site Inspection Checklist and Interview Summary Forms

TABLE C-1
Site Inspection Team Roster
Site Inspection- June 1, 2004
Burbank Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Name	Title	Affiliation
Vic Savage	Project Director	United Water
Richard Bobadilla	Operator	United Water
Tina Girard	Task Manager	CH2M HILL Oakland Office

Five-Year Review Site Inspection Checklist
San Fernando Valley Superfund Site (Area 1)
Burbank OU

I. SITE INFORMATION	
Site name: San Fernando Valley Superfund Site (Area 1) Burbank OU	**Date of inspection:** June 1, 2004
Location and Region: Burbank, CA, Region IX	**EPA ID:** CAD980894893
Agency, office, or company leading the five-year review: CH2M HILL for EPA Region IX	**Weather/temperature:** approximately 85°, sunny
Remedy Includes: (Check all that apply) _ Landfill cover/containment _ Access controls _ Institutional controls X Groundwater pump and treatment _ Surface water collection and treatment _ Other	
Attachments: X Inspection team roster attached Table B-1 X Site map attached (Figures 1-1 and 3-1)	

II. **INTERVIEWS** (Check all that apply)		
1. **O&M site manager** Vic Savage Name	United Water, Project Director Title	6/1/04 Date
Interviewed: Problems, suggestions: see Interview Summary Form NOTE: All referenced attachments can be found in Five-Year Review Report.	Phone No 818-846-1002	
2. **O&M Operator** Richard Bobadilla Name	United Water, Operator Title	6/1/04 Date
Interviewed: Problems, suggestions: See Interview Summary Form	Phone No. 818-846-1002	

3. **Local regulatory authorities and responsible agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency City of Burbank

Contact				
	Albert Lopez	Operations Superintendent	6/1/04	818-238-3500
	Name	Title	Date	Phone No.

Problems; suggestions:
See interview summary form.

Agency DHS

Contact				
	Joe Cisologo	District Engineer	7/20/04	213-580-5743
	Name	Title	Date	Phone No.

Problems; suggestions:
See Interview Summary Form

4. **Other interviews**:

Dixon Oriola, RWQCB, Senior Engineering Geologist	not available for interview	213-576-6803
Mark Mackowski, ULARA Water Master	6/14/04	213-367-0896
Eric Peterson, Earth Tech, Project Manager (Operations 1996-2000)	6/4/04	562-951-2053
Bob Simpson, Lockheed Martin, Operator 1996-1998	7/30/04	818-847-0584

III. ONSITE DOCUMENTS AND RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

X O&M manual — X Readily available — X Up to date
X As-built drawings — X Readily available — X Up to date
X Maintenance logs — X Readily available — X Up to date
Remarks: All O&M documentation was readily available and up to date.

2. **Site-Specific Health and Safety Plan**

X Contingency plan/emergency response plan — X Readily available — X Up to date
Remarks

3. **O&M and OSHA Training Records** — X Readily available — X Up to date — _ N/A
Remarks

4.	**Permits and Service Agreements**			
	X Air discharge permit (SCAQMD)	X Readily available	_ Up to date	_ N/A
	X Effluent discharge (NPDES)	X Readily available	_ Up to date	_ N/A
	_ Waste disposal	_ Readily available	_ Up to date	_ N/A
	X Other permits DHS	X Readily available	X Up to date	_ N/A
	Remarks NPDES Permit and SCAQMD permit not required under CERCLA, however, substantive permit requirements must be met.			
5.	**Air Emissions Generation Records**	X Readily available	X Up to date	_ N/A
	Remarks			
6.	**Settlement Monument Records**	_ Readily available	_ Up to date	X N/A
	Remarks			
7.	**Groundwater Monitoring Records**	X Readily available	X Up to date	_ N/A
	Remarks Available through EPA, the City, or PRP			
8.	**Leachate Extraction Records**	_ Readily available	_ Up to date	X N/A
	Remarks			
9.	**Discharge Compliance Records**			
	X Air	X Readily available	X Up to date	_ N/A
	X Water (effluent)	X Readily available	X Up to date	_ N/A
	Remarks			
10.	**Daily Access/Security Logs**	X Readily available	X Up to date	
	Remarks			

IV. O&M COSTS

1. **O&M Organization**
   - _ State in-house
   - X Contractor for City
   - _ PRP in-house
   - _ Contractor for PRP
   - _ Other

2. **O&M Cost Records**
   - X Readily available
   - X Up to date [Available through EPA or Trustee]
   - _ Funding mechanism/agreement in place
   - _ NA

   Original O&M cost estimate See Five Year Review report _ Breakdown attached

   Total annual cost by year for review period if available

Date	Date	Total cost	
From ______	To ______	______	Breakdown attached
From ______	To ______	______	Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons:
See Section 4.2 for O&M costs. Interview forms describe design modifications. High O&M costs are due to 1,2,3-TCP LPGAC breakthrough, VPGAC screen failure, and Tank 600 modifications. Power is the largest cost overall.

V. ACCESS AND INSTITUTIONAL CONTROLS ✗ Applicable

A. Fencing

1. **Fencing** _ Location shown on site map X Gates secured _ N/A
Remarks Secure; gates opened by operator only.

B. Other Access Restrictions

1. **Signs and other security measures** _ Location shown on site map _ N/A
Remarks 24 hour day operator on-site.

C. Institutional Controls

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented _ Yes _ No X N/A
Site conditions imply ICs not being fully enforced _ Yes _ No X N/A

Type of monitoring (e.g., self-reporting, drive by)
Frequency
Responsible party/agency

Contact
Name Title Date Phone No.

Reporting is up-to-date _ Yes _ No X N/A
Reports are verified by the lead agency _ Yes _ No X N/A

Specific requirements in deed or decision documents have been met _ Yes _ No X N/A
Violations have been reported _ Yes _ No X N/A
Other problems or suggestions: _ Report attached

2. **Adequacy** _ ICs are adequate _ ICs are inadequate X N/A
Remarks

D. General

1.	**Vandalism/trespassing** _ Location shown on site map X No vandalism evident Remarks______________________
2.	**Land use changes onsite** Remarks No land use changes at treatment facility since constructed.
3.	**Land use changes offsite** Remarks There have been no land use changes on neighboring properties during the last 4 years. Within the plume area redevelopment has occurred.

VI. GENERAL SITE CONDITIONS	
A. Roads	X Applicable
1.	**Roads** X Location shown on site map X Roads adequate _ N/A Remarks
B. Other Site Conditions	
	Remarks ______________________ ______________________ ______________________ ______________________ ______________________

VII. LANDFILL COVERS Not Applicable X	
A. Landfill Surface	
1.	**Settlement** (Low spots) _ Location shown on site map _ Settlement not evident Areal extent__________ Depth__________ Remarks______________________
2.	**Cracks** _ Location shown on site map _ Cracking not evident Lengths __________ Widths__________ Depth__________ Remarks______________________
3.	**Erosion** _ Location shown on site map _ Erosion not evident Areal extent__________ Depth __________ Remarks______________________
4.	**Holes** _ Location shown on site map _ Holes not evident Areal extent__________ Depth __________ Remarks______________________
5.	**Vegetative Cover** _ Grass _ Cover properly established _ No signs of stress Trees/Shrubs (indicate size and locations on a diagram) Remarks______________________
6.	**Alternative Cover** (armored rock, concrete, etc.) _ N/A Remarks______________________

7.	**Bulges** Areal extent________________ Remarks ________________________________	_ Location shown on site map Height________________	_ Bulges not evident
8.	**Wet Area/Water Damage** _ Wet areas _ Ponding _ Seeps _ Soft subgrade Remarks ________________________________	_ Wet areas/water damage not evident _ Location shown on site map _ Location shown on site map _ Location shown on site map _ Location shown on site map	 Areal extent__________ Areal extent__________ Areal extent__________ Areal extent__________
9.	**Slope Instability** _ Slides _ Location shown on site map _ No evidence of slope instability Areal extent__________ Remarks ________________________________		
B.	**Benches** _ Applicable _ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench** Remarks ________________________________	_ Location shown on site map	_ N/A or okay
2.	**Bench Breached** _ Location shown on site map _ N/A or okay Remarks ________________________________		
3.	**Bench Overtopped** _ Location shown on site map _ N/A or okay Remarks________________________________		
C.	**Letdown Channels** _ Applicable _ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** _ Location shown on site map _ No evidence of settlement Areal extent________________ Depth________________ Remarks ________________________________		
2.	**Material Degradation** _ Location shown on site map _ No evidence of degradation Material type________________ Areal extent__________ Remarks ________________________________		
3.	**Erosion** _ Location shown on site map _ No evidence of erosion Areal extent________________ Depth________________ Remarks________________________________		

4.	**Undercutting** _ Location shown on site map _ No evidence of undercutting Areal extent________ Depth________ Remarks ________________________________
5.	**Obstruction** Type________ _ No obstruction _ Location shown on site map Areal extent________ Size________ Remarks ________________________________
6.	**Excessive Vegetative Growth** Type ________ _ No evidence of excessive growth _ Vegetation in channels does not obstruct flow _ Location shown on site map Areal extent________ Remarks ________________________________
D. Cover Penetrations	_ Applicable X N/A
1.	**Gas Vents** _ Active _ Passive _ Properly secured/located _ Functioning _ Routinely sampled _ Good condition _ Evidence of leakage at penetration Remarks ________________________________
2.	**Gas Monitoring Probes** _ Properly secured/located _ Functioning _ Routinely sampled _ Good condition _ Evidence of leakage at penetration Remarks ________________________________
3.	**Monitoring Wells** (within surface area of landfill) _ Properly secured/located _ Functioning _ Routinely sampled _ Good condition _ Evidence of leakage at penetration - no Remarks ________________________________
4.	**Leachate Extraction Wells** _ Properly secured/located Functioning _ Routinely sampled _ Good condition _ Evidence of leakage at penetration _ Needs O&M _ N/A Remarks________________________________
5.	**Settlement Monuments** _ Located _ Routinely surveyed _ N/A Remarks________________________________
E. Gas Collection and Treatment	_ Applicable X N/A
1.	**Gas Treatment Facilities** _ Flaring _ Thermal destruction _ Collection for reuse _ Good condition _ Needs O&M Remarks________________________________

2.	**Gas Collection Wells, Manifolds and Piping** _ Good condition _ Needs O&M Remarks________________	
3.	**Gas Treatment Facilities** (e.g., gas monitoring of adjacent homes or buildings) Good condition _ Needs O&M _ N/A Remarks ________________	
F. Cover Drainage Layer	_ Applicable	_ N/A
1.	**Outlet Pipes Inspected** _ Functioning _ N/A Remarks ________________	
2.	**Outlet Rock Inspected** _ Functioning _ N/A Remarks________________	
G. Detention/Sedimentation Ponds	_ Applicable	_ N/A
1.	**Siltation** Areal extent________ Depth________ _ N/A _ Siltation not evident Remarks ________________	
2.	**Erosion** Areal extent________ Depth ________ _ Erosion not evident Remarks ________________	
3.	**Outlet Works** _ Functioning _ N/A Remarks ________________	
4.	**Dam** _ Functioning _ N/A Remarks ________________	
H. Retaining Walls	_ Applicable	X N/A
1.	**Deformations** _ Location shown on site map _ Deformation not evident Horizontal displacement________ Vertical displacement________ Rotational displacement________ Remarks ________________	
2.	Degradation _ Location shown on site map _ Degradation not evident Remarks ________________	
I. Perimeter Ditches/Off-Site Discharge	_ Applicable	X N/A
1.	**Siltation** _ Location shown on site map _ Siltation not evident Areal extent________ Depth________ Remarks________________	
2.	**Vegetative Growth** _ Location shown on site map _ N/A _ Vegetation does not impede flow Areal extent________ Type________ Remarks ________________	

3.	**Erosion** _ Location shown on site map _ Erosion not evident Areal extent________________ Depth________________ Remarks________________
4.	**Discharge Structure** _ Functioning X N/A Remarks ________________
	VIII. VERTICAL BARRIER WALLS X Not Applicable
1.	**Settlement** _ Location shown on site map _ Settlement not evident Areal extent________________ Depth________________ Remarks ________________
2.	**Performance Monitoring** Type of monitoring________________ _ Performance not monitored Frequency________________ _ Evidence of breaching Head differential________________ Remarks________________
	IX. GROUNDWATER/SURFACE WATER REMEDIES X Applicable
A.	**Groundwater Extraction Wells, Pumps, and Pipelines** X Applicable
1.	**Pumps, Wellhead Plumbing, and Electrical** X Good condition _ All required wells located _ Needs O&M _ N/A Remarks ________________
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** X Good condition _ Needs O&M Remarks Check valves (see notes)
3.	**Spare Parts and Equipment** X Readily available _ Good condition _ Requires upgrade _ Needs to be provided Remarks Use MP2 onsite to track inventory; there is room for improvement for inventory/tracking of spare parts. Need one storage area for all spare parts.
B.	**Surface Water Collection Structures, Pumps, and Pipelines** X Not Applicable
1.	**Collection Structures, Pumps, and Electrical** _ Good condition _ Needs O&M Sump system and drainage. Remarks ________________
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** _ Good condition _ Needs O&M _ N/A Remarks ________________

3.	**Spare Parts and Equipment** _ Readily available _ Good condition _ Requires upgrade _ Needs to be provided _ N/A Remarks ____
C. Treatment System X Applicable	
1.	**Treatment Train** (Check components that apply) _ Metals removal _ Oil/water separation _ Bioremediation X Air stripping X Carbon adsorbers X Filters Bag _ Additive (e.g., chelation agent, flocculent) X Good condition _ Needs O&M X Sampling ports properly marked and functional _ Sampling/maintenance log displayed and up to date tagged w/ sample ID# _ Equipment properly identified X Quantity of groundwater treated annually Approximately 10,500 acre feet _ Quantity of surface water treated annually NA Remarks
2.	**Electrical Enclosures and Panels** (properly rated and functional) _ N/A X Good condition _ Needs O&M Remarks Operator recommended upgrade but they function as needed; recently replaced voltmeter
3.	**Tanks, Vaults, Storage Vessels** Remarks No vaults, back wash tank is empty; solvent recovery tank – good condition. Transducer problems with separator. Total of 6 tanks onsite.
4.	**Discharge Structure and Appurtenances** _ Good condition X Needs O&M (minimal according to operator) Remarks Problems with valve able to resolve modulation issue; some startup problems.
5.	**Treatment Building(s) – support building** _ N/A X Good condition (especially roof and doorways) _ Needs repair _ Chemicals and equipment properly stored CL50 (mexametaphosphate??). Remarks Trailer and storage areas in good condition.
6.	Monitoring Wells (pump and treatment remedy) X Properly secured/locked X Functioning X Routinely sampled X Good condition _ Needs O&M _ N/A Remarks ____
D. Monitored Natural Attenuation X NA	
1.	**Monitoring Wells** (natural attenuation remedy) _ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition All required wells located ____ _ Needs O&M Remarks ____
X. OTHER REMEDIES	

	If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
	XI. OVERALL OBSERVATIONS
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy was designed to extract and treat VOC impacted groundwater at 9,000 to concentrations less then MCLS. The concentration of all COCs at the blendpoint have been less than MCLs and SALs.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. O&M procedures are in place to ensure protectiveness of the remedy; however the system as not consistently met the 9,000 gpm objective since startup.
C.	**Early Indicators of Potential Remedy Failure**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of .unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. VPGAC screen failure is an ongoing O&M problem; modifications have been approved and will be addressed in late 2003 – early 2004. TCP breakthrough is the driver for LPGAC changeout; despite modifications to LPGAC in 2003 this is an ongoing issue requiring further investigation.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Proceed with planned VPGAC repairs, implement recommendations of the Operational Assessment (Tetra Tech 2003) where feasible, proceed with the Performance Attainment Study planned for 2004-2005 and modify as needed based on results.

Five-Year Review Interview Record	**Interviewee:** Bob Simpson/Site Manager for BOU Construction, start-up & initial operations & maintenance, 1992-97/ Lockheed Martin ph. 818-847-0584 Robert.w.simpson@lmco.com

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit	CAD980894893	7/30/04	Phone ■ Fax/email ☐ In person ☐

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Rachel Loftin	US EPA Region 9	(415)972-3253	Loftin.Rachel@epa.gov	75 Hawthorne Street San Francisco, CA 94105
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions

1. **What is your overall impression of the work conducted at the site? (general sentiment)** Managed construction, start-up & initial operations & maintenance of the water treatment plant for Lockheed Martin.

Response: Good.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

Response: Yes. There was a two-year delay, however, due to issues not related to the BOU water treatment plant. The system, once completed, performed to required specifications.

3. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?**

Response: An additional COC, 1,2,3 TCP, was discovered. This contaminant was not known when the Record of Decision was prepared in 1989. The system was not designed to remediate this contaminant. Presence of 1,2,3-TCP has shortened the expected LPGAC beds life because it is not removed by the stripping towers. Efforts have been made to control the influent concentration of 1,2,3-TCP in order to extend the LPGAC beds life. The system has met performance specifications when tested at start-up and thereafter for the contaminants which it was designed for.

4. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

Response: Yes. During Mr. Simpson's tenure as O&M manager there were planned staff to perform maintenance activities during the day shift and typically 1 operator to monitor operations during swing and graveyard shifts. The O&M Plans were followed.

5. **Have there been unexpected O&M difficulties or costs at the site during your time there? If so, please give details..**

Response: Yes: Formerly LPGAC was regenerated on-site. Loading and unloading the LPGAC units in order to regenerate the carbon was difficult. This on-site regeneration has ceased. Twice during LPGAC regeneration the vessel used imploded after the steam cycle due to a build up of condensed steam. It was problematic to transfer carbon in and out of beds and to get good reactivation. The current procedure is to remove the spent carbon from the vessels and replace with virgin carbon obtained from an off-site source.

6. **Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.**

Response: At system startup the design efficiency was verified through testing and optimization. The testing included airflow calibration, checking VPGAC volatiles removal efficiency and stripper performance, etc. In order to reduce sampling efforts, some changes were also made to the well sampling program. This included reduced sampling of wells with a stable history and the addition of wells within the area of concern where less data was available.

7. **Are you aware of any ongoing community concerns regarding the site or its administration?**

Response: No.

8. **Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?**

Response: In approximately 1995-96, there was a fire in a VPGAC vessel which damaged several beds and burned down the exhaust stack. The fire department responded. The carbon fire was a result of an exothermic reaction between the contaminants. This is thought to be the result of non-routine operations prior to the start of full scale operation supplying water to the City of Burbank. In addition, there has been some mild vandalism/trespassing due to the nearby ball park and people coming to find foul balls.

9. **Do you have any comments, suggestions, or recommendations regarding the site?**

Response: With the long history of operations, the staff should be aware of weak spots. Automation has helped a lot. Mr. Simpson believes it is possible to operate the facility with less than 100% onsite O&M presence. At least one optimization study has been performed. There were some early problems but these were or are being worked through (VPGAC vessel redo has not yet been completed). Overall, according to Mr. Simpson, it is a good system and is functioning as designed. Mr. Simpson took a lot of personal pride in his work at the BOU.

<table>
<tr><td colspan="3">Five-Year Review Interview Record</td><td colspan="3">Interviewee: Richard Bobadilla/ Operator/United Water/ almost 4 years working on the project.</td></tr>
<tr><td colspan="2">Site Name</td><td colspan="2">EPA ID No.</td><td>Date of Interview</td><td>Interview Method via</td></tr>
<tr><td colspan="2">San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit</td><td colspan="2">CAD 980894893</td><td>6/1/04</td><td>Phone ☐
Fax/email ☐
In person ■</td></tr>
<tr><td>Interview Contacts</td><td>Organization</td><td>Phone</td><td>Email</td><td colspan="2">Address</td></tr>
<tr><td>Rachel Loftin</td><td>US EPA Region 9</td><td>(415)972-3253</td><td>Loftin.Rachel@epa.gov</td><td colspan="2">75 Hawthorne Street
San Francisco, CA 94105</td></tr>
<tr><td>Tina Girard</td><td>CH2M HILL / SFO, as rep of EPA</td><td>(510) 587-7586</td><td>tgirard@ch2m.com</td><td colspan="2">155 Grand Ave, Suite 1000
Oakland, CA 94612</td></tr>
</table>

Interview Questions (Please address period since 1996)

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response: No complaints.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

Response: Variable speed motors are recommended as all pumps rely on valves.

3. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?**

Response: Overall decrease for all COCs except Cr which is redistributed.
Nitrates – rely on blending
New COCs: 1,2,3-TCP and Cr(T)
- Do not have to shutdown pumping due to concentrations of new COCs; manage through open communication with the City of Burbank to meet water quality and production targets.

4. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

Response:
- continuous O&M presence
- 3 times a day an inspection checklist is completed.
- Shutdown or remedied if deficiency found.
- Commonly request 24 hour turn around time for analysis
- *Sampling frequency increases with concentration*
- City of Burbank samples at Blend Point

- United Water will move offsite to perform additional sampling before Blend Point when the COCs are at 75% LPGAC sampling port.
- –1,2,3-TCP monitoring plan is a part of the DHS permit.

5. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.

Response: VPGAC – filters, proposal for modification has been submitted.
LPGAC – filters completed 12/03

6. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response: City of Burbank is considering requesting waivers for ND analytes. There are more staff on the dayshift now. A regular maintenance schedule is followed.

7. Are you aware of any ongoing community concerns regarding the site or its administration?

Response: None.

8. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?

Response: None; graffiti once or twice.

9. Do you have any comments, suggestions, or recommendations regarding the site?

Response: None. LPGAC repairs appear to be operating as planned. Recommend proceeding with VPGAC screen repair as planned.

Five-Year Review Interview Record	**Interviewee:** Joseph Crisologo / District Engineer / DHS

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit	CAD 980894893	7/20/04	Phone ■ Fax/email ☐ In person ☐

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Rachel Loftin	US EPA Region 9	(415)972-3253	Loftin.Rachel@epa.gov	75 Hawthorne Street San Francisco, CA 94105
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since 1996)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response: Great; interesting system – started before Policy 97-005; despite that the BOU has dealt with emerging COCs as they come about. 1,2,3 TCP is the major COC taking LPGAC offline. BOU (Lockheed) worked hard to find a laboratory method with a reporting limit as low as the SAL of 5 ppt.

1.Future concern is hexavalent chromium, other contaminants not yet detected due to the high concentrations of solvents in the influent water.
2. Nitrate is an issue but have a blending plan.
3. In the past, there have been issues with Tank 600 which is used for holding condensate from regeneration of VPGAC carbon. The condensate waste which contained concentrated VOCs was being treated by incorporation at the head of the treatment system. DHS insisted that the Tank 600 material not be placed at the head of plant. To deal with this issue, a small LPGAC system was installed that is used specifically for treatment of the condensate waste. The LPGAC from this system uses only virgin carbon during changeouts. The spent carbon is disposed of off-site.
4. System operators have been responsive to DHS requirements including good recent modifications to LPGAC and proposed changes to VPGAC.

2. Is the remedy functioning as expected? How well is the remedy performing?

Response: The BOU is operating within DHS guidelines for VOCs. Expected changes due to emerging COCs. LPGAC breakthrough of 1,2,3-TCP means shorter run times.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response:
Discovery of Additional COCs: 1,2,3-TCP and hexavalent chromium
Uncertain if the following emerging contaminants are an issue: Perchlorate, NDMA, 1,2 – DCA,

carbon tetrachloride, 1,4-dioxane (3 ppb = action level (SAL), no MCL)
EPA has a system of upgradient monitoring wells which should be looking for new COCs and emerging contaminants.

Hexavalent chromium MCL/PHG: waiting for OEHHA to provide a revised PHG. Currently MCL for total chromium at 50 ppb is enforced. The City of Burbank would like to be more conservative and implement PHG's. OEHHA withdrew previous PHG.

Concerned that the high concentration of TCE and PCE may mask other VOCs of concern because of elevated detection limits.

The 97-005 permit requirements include upgradient well data to be provided. Even though the BOU is not operating under a 97-005 permit and the current permit does not require it, the City of Burbank is aware/concerned and collecting upgradient data anyway.

4. **Are you aware of any institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed or unusual activities at the site? If so, please describe in detail.**

Response: Land use in BOU area is a zoning issue.
DHS Policy 97-005 requires identification of well sources and protective measures. This may not pertain to impacted extraction wells – emphasizes pre-planning necessary for future COCs.
Perchlorate MCL and arsenic MCL are due to be published soon.
Legislation in the works to define a SAL. SAL is always a recommendation; based on 1×10^{-6} risk.
Prime directive is to look for best water and provide it. BOU is extremely impaired source.

5. **Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.**

Response: There have been unexpected O&M difficulties primarily due to 1,2,3-TCP. Need further definition of the effects of 1,2,3 TCP, carbon fines, and VPGAC screen failure on the treatment system. In addition, deterioration of plant facilities due to age including pumps, motors, lines, etc. There is also the issue relating to the lowering water table due to pumping and how it may impact future operations and water quality.

6. **Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.**

Response: Yes. 1,2,3-TCP has been primary driver. There has been discussion that the BOU may propose decreased monitoring schedule. Also, looking into better controls and accuracy with respect to the LPGAC operation – modification of the LPGAC.

7. **Are you aware of any ongoing community concerns regarding the site or its administration?**

Response: Nothing other than the existing usual concerns and hexavalent chromium.

8. Are you aware of any events, incidents, or activities that have occurred at the site, such as emergency response from local authorities?

Response: No.

9. Do you have any comments, suggestions, or recommendations regarding the site?

Response: Continue looking for emerging COCs. Increase capability to detect them despite the potential masking due to high concentrations of TCE and PCE. If new COCs are present, increase the capability of the treatment system.

BOU has permit from DHS and must comply, not aware of any violations with respect to the site.

Five-Year Review Interview Record			**Interviewee:** Albert Lopez / Project Coordinator / Operations Superintendent / City of Burbank	
Site Name		**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit		CAD 980894893	6/1/04	Phone _ Fax/email _ In person ■

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Rachel Loftin	US EPA Region 9	(415)972-3253	Loftin.Rachel@epa.gov	75 Hawthorne Street San Francisco, CA 94105
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response: Overall very proud; good design (some problems – as this is one of the first large VOC treatment facilities designed in the State). Transition from Lockheed to the City of Burbank increased from 3 months to 6 months due to maintenance issues at the time (poor maintenance etc.)

2. Is the remedy functioning as expected? How well is the remedy performing?

Response: The remedy is functioning as expected (removes VOCs). Not performing as well as expected relating to capacity, though. Mechanically some equipment is wearing out too early (VPGAC & well equipment). There has been premature screen failure at VPGAC. There is also a concern that carbon dust is emitted through VPGAC filters.

The well field is not producing 9,000 gpm, this will be evaluated within approximately the next 6 months.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response:
-Overall decline in contaminant concentrations. Concerned that this may be related to decreased water table. Burbank will start replenishing the water table soon.
-New COCs: 1,2,3-TCP (leading COC for carbon change outs), Cr(T), Cr(VI) effluent from the OU must be less than half the MCL for total chromium.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. **Response:** Continuous operations staff. O&M activities are performed during the day.
5. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details. **Response:** Yes. Items such as well field pumps and motors, steel check valves, flaps, etc. have required unexpected maintenance. VPGAC-screen issues have caused the need to shutdown the entire treatment train on occasion. Over the last 2 years all 6 VPGAC screens have failed. VPGAC modifications will be submitted within 2 weeks and are expected to be made within the next 6 months.
6. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency. **Response:** Many improvements since City of Burbank took over. All sampling as needed for DHS requirements. Once LPGAC and VPGAC repairs are completed want to minimize sampling efforts.
7. Are you aware of any ongoing community concerns regarding the site or its administration? **Response:** One older man called Albert concerned about radioactivity in wellfield (former Lockheed employee). The concentration of uranium was at the MCL once.
8. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities? **Response:** VPGAC vessel fire prior to City taking over operations. Next door fire extinguishers were released once.
9. Do you have any comments, suggestions, or recommendations regarding the site? **Response:** The project is performed as a group. Fulfilled objectives and work towards them. Would like more explanation as to why packers cannot be deflated. Approved Phase I O&M manual date July 11, 1994 under Chapter 5.0 Contingency Plan, Section 5.2 Criteria for Packer Deflation recommends that this be done if regional water levels in the vicinity of the extraction well field decline such that water elevations, combined with well-bore draw-down, result in alarm conditions and insufficient yield to meet demand requirements. All wellfields downgradient of the OU have not been operational since 1980's. 2 wells operational upgradient. Not working for past 2 years due to construction. Cannot blend at these wells. Total chromium > 5 ppb. operated 1992 – 2001 or 2002 at Burbank power plant.

Lake Street GAC – well head treatment. 4 vessels x 20,000 lb each; 20,000 gpm.

O&M manual states during low water years can deflate packers to increase production.

Lockheed's contractor operated all 9 wells at all time – possibly overworked equipment.

EPA does not acknowledge criteria of O&M plan – see Phase I approved. O&M plan Phase II not approved.

DHS only concern is effluent.

EPA did not approve recent request to deflate packer.

City of Burbank counts on supply from OU; ultimately wanting to use their wellfield again.

BOU supplied approximately 70% of the City of Burbank's water supply prior to 1,2,3-TCP problem; currently 40%.

Recommend a new study to address need for new wells and packer issue.

Overbudget due to LPGAC/VPGAC repairs. Prepared a design for VPGAC repairs and will submit to EPA in 2 weeks.

Older equipment: Backwash system; need storage area for all parts.

This year anticipate the BOU will be operating at 65% of capacity.

<table>
<tr><td colspan="3">Five-Year Review Interview Record</td><td colspan="3">Interviewee:
Eric Peterson / Former Project Manager
1998-2000 / Earth Tech</td></tr>
<tr><td colspan="2">Site Name</td><td colspan="2">EPA ID No.</td><td>Date of Interview</td><td>Interview Method via</td></tr>
<tr><td colspan="2">San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit</td><td colspan="2">CAD 980894893</td><td>6/4/04</td><td>Phone ■
Fax/email □
In person □</td></tr>
<tr><td>Interview Contacts</td><td>Organization</td><td>Phone</td><td>Email</td><td colspan="2">Address</td></tr>
<tr><td>Rachel Loftin</td><td>US EPA Region 9</td><td>(415)972-3253</td><td>Loftin.Rachel@epa.gov</td><td colspan="2">75 Hawthorne Street
San Francisco, CA 94105</td></tr>
<tr><td>Tina Girard</td><td>CH2M HILL / SFO, as rep of EPA</td><td>(510) 587-7586</td><td>tgirard@ch2m.com</td><td colspan="2">155 Grand Ave, Suite 1000
Oakland, CA 94612</td></tr>
</table>

Interview Questions (Please address period since 1996)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response: Very good. Great treatment plant but complicated so it requires a lot of maintenance and a continuous presence. Capture is good, even when operating at less than 9,000 gpm.

2. Is the remedy functioning as expected? How well is the remedy performing?

Response: The remedy is functioning as expected and performing well. There is a regional water level issue of declining water levels in the San Fernando Valley. Capture was good at time Eric was involved.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response: TCE and PCE concentrations have decreased. Total chromium is present and is an emerging contaminant. Earth Tech wrote blending plan for total chromium for the BOU which specifies a goal of 20% of the MCL.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response: 24 hour a day presence. Not sure if the City of Burbank is operating under the same O&M Plan.

5. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.

Response: Tank 600 – part of treatment process was unacceptable to DHS. Earth Tech completed a study to improve this part of the process. Installed second small treatment system (LPGAC - 2 vessels) to take care of the waste from Tank 600. Permitted under NPDES.
Decreasing water levels throughout the basin, however well packers were installed in extraction wells at the time of construction to deal with this issue.

6. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response: Sampling efforts as prescribed by DHS and EPA were followed to ensure effluent protective. O&M – constant engineering presence to optimize cost and performance.

7. Are you aware of any ongoing community concerns regarding the site or its administration?

Response: City council meetings during "Erin Brockvich" time. No community interest directly involved with site.

8. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?

Response: None.

9. Do you have any comments, suggestions, or recommendations regarding the site?

Response: Look at the capture in context of what is prescribed in ROD. ROD mandated a certain percentage of plume (TCE) capture.
Interviewer: I noticed an SVE system when onsite, is this part of the BOU? Interviewee: The SVE system is not a part of the BOU and is operating at pulse now; past point of diminishing returns. It is beneath shopping mall. Majority of wells north/central of B-1.

Interviewer: Can you provide more history of operations?
Interviewee: Earthtech won the contract mid-1998 to operate BOU until end of 2000. PSG – prior contractor (Public Service Group). Mid 1998 to Dec. 2000 ~2.5 years. 6 month transition period during second half of 2000 to the City of Burbank.

Additional Note: There is a requirement for plant manager and operators to obtain DHS certified grades.

Five-Year Review Interview Record			**Interviewee:** Vic Savage / Project Director/ United Water / 4 months on project		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit		CAD 980894893		6/1/04	Phone ☐ Fax/email ☐ In person ■
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Rachel Loftin	US EPA Region 9	(415)972-3253	Loftin.Rachel@epa.gov	75 Hawthorne Street San Francisco, CA 94105	
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612	

Interview Questions

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response: Professional approach; understand how important human health/environment protectiveness is. Good working relationship amongst Stakeholders. EPA is involved in every aspect of project.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

Response: The remedy is functioning well. Cannot meet the extraction rate of 9,000 gpm through a combination of well delivery limitations and operational constraints. Making improvements to increase reliability; 9,000 gpm not met recently due to O&M issues. Well delivery and operations (90% design, 10% O&M issues) impede reaching 9,000 gpm. Overall the treatment system is meeting quality but not meeting quantity.

3. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?**

Response: Some sand is pumped from the extraction wells reaches LPGAC, possibly influencing the reliability and operability of plant, but, at this time it is not a important impediment to reliability or operability.
The City of Burbank and UW work closely together to maximize production and ensure product quality

4. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

Response: (See Richard's Bobadilla's response) United Water's main role is service and repair. Contract work requiring special skills (e.g., pump seal replacement, pump overhauls, laboratory analyses) because primary staff are operators.

5. **Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..**

Response: (See Albert Lopez's response.)
LPGAC recently retrofitted.
There are ongoing improvements to the overall system.
After 10 years of operation, policies and recommendations are still created and reviewed.

6. **Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.**

Response: Vic was brought to the project, in part, to improve financials and site management using his background in performance improvement (e.g., reduce overtime costs and following purchasing best practices.)

7. **Are you aware of any ongoing community concerns regarding the site or its administration?**

Response: None.

8. **Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?**

Response: None.

9. **Do you have any comments, suggestions, or recommendations regarding the site?**

Response: Blowers can be noisy; ask staff to repair belts, etc. when needed.

- The previous United Water contract was low margin, therefore, high staff turnover; new contract requests additional money to compensate staff for this.
- Recommend 5 year contract instead of renewing every year.
- United Water has another plant nearby – would like to send them samples for analysis to improve efficiency, however need a 5-year contract.

Five-Year Review Interview Record			**Interviewee:** Mark Mackowski / ULARA Water Master mark.mackowski@ladwp.com		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – Burbank Operable Unit		CAD 980894893		6/14/04	Phone ■ Fax/email ☐ In person ☐
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Rachel Loftin	US EPA Region 9	(415)972-3253	Loftin.Rachel@epa.gov	75 Hawthorne Street San Francisco, CA 94105	
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612	

Interview Questions (Please address period since 1996.)

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response: Favorable.

2. **Are you aware of any changes in State laws and regulations that may impact protectiveness?**

Response: MCLs:
In the future, development of a MCL for hexavalent chromium may impact the BOU. PHG for hexavalent chromium is due Dec 04 at the earliest; MCL mid 2005 at earliest.
1,2,3 TCP is a concern due to diminishing carbon bed life. Perchlorate – not a major concern. Uncertain if 1,4 dioxane is a concern at the site.

3. **Do you feel well informed about the site's activities and progress?**

Response: Yes, well informed by City of Burbank and quarterly meetings.

4. **Are you aware of any institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed or unusual activities at the site? If so, please describe in detail.**

Response: No project changes.

5. Is the remedy functioning as intended?

Concerned about lower than expected pumping rate (<9,000 gpm), never reached the 9,000 gpm goal. A system evaluation is in progress. As stated in the CD, the goal is 9,000 gpm.

Happy with plume containment and operations. LPGAC recently modified.

The Watermaster's groundwater modeler evaluates capture (Hadi Johny).

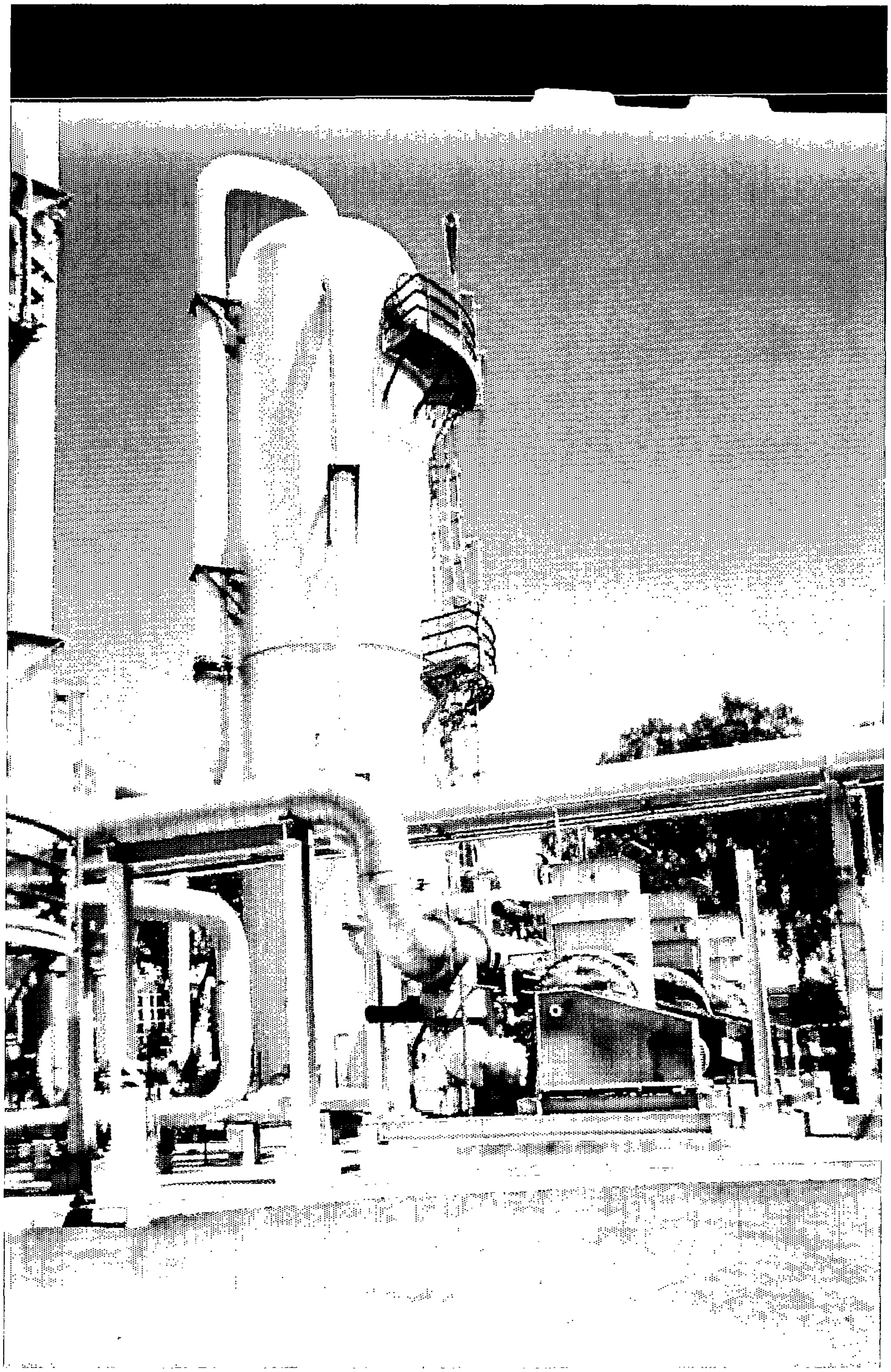
Overall a good job. All members are informed, the watermaster is supportive. The BOU is protective of human health and the environment.

Interviewer: Are you aware of any production wells in the vicinity of the BOU?
Interviewee: LADWP large production wells upgradient of Burbank include Tujunga, Rinaldi – Toluca, and the North Hollywood well field

6. Do you have any comments, suggestions, or recommendations regarding the site?

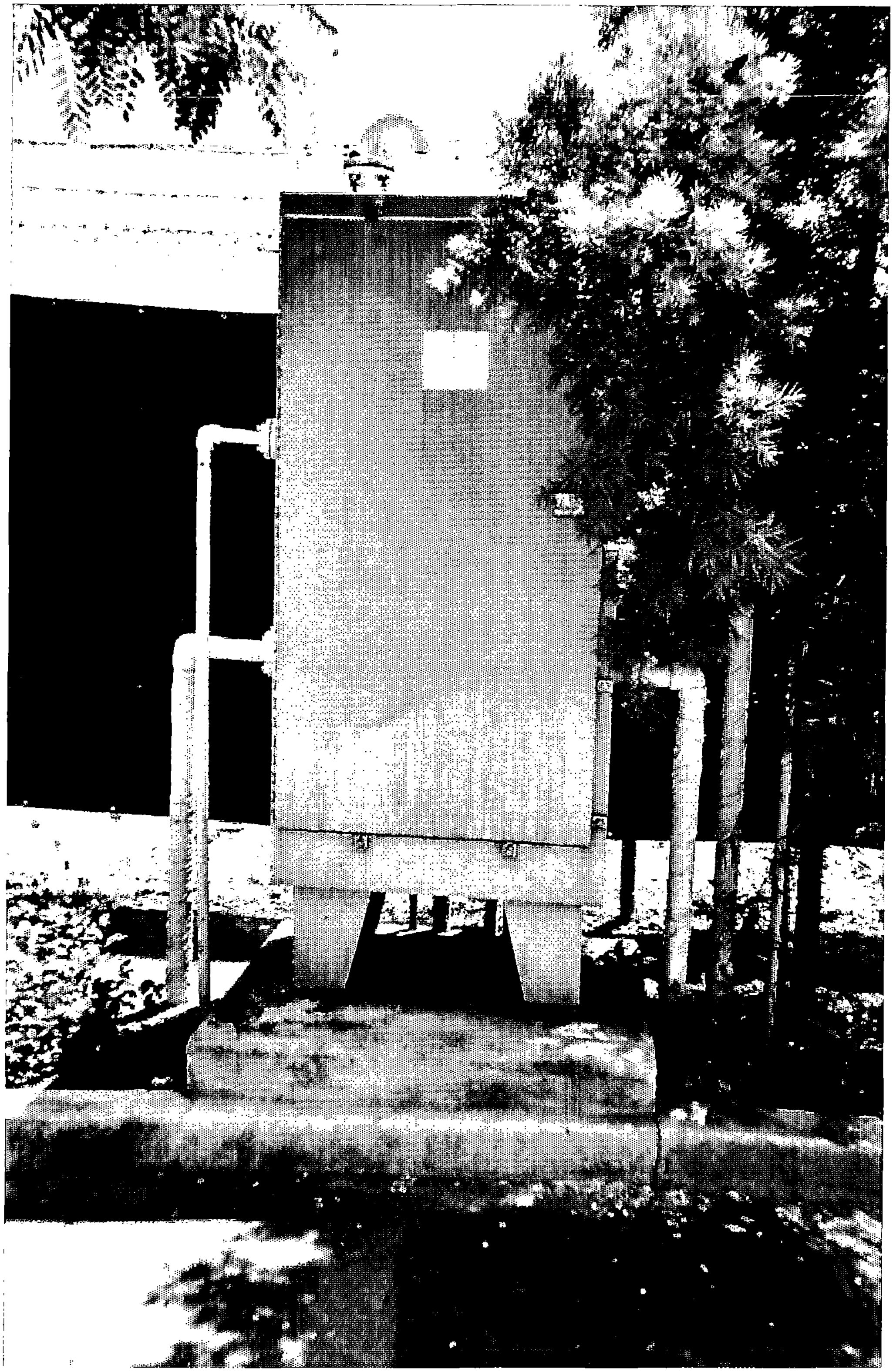
Response: Concerned about declining water table throughout basin if production is not at design capacity, in the future as water level declines possibly lower rates of production. Recommend evaluating the impact of deflating packers. Support packer deflating test. Burbank may not be able to extract adjudicated water rights.

Appendix D
Site Inspection Photographs

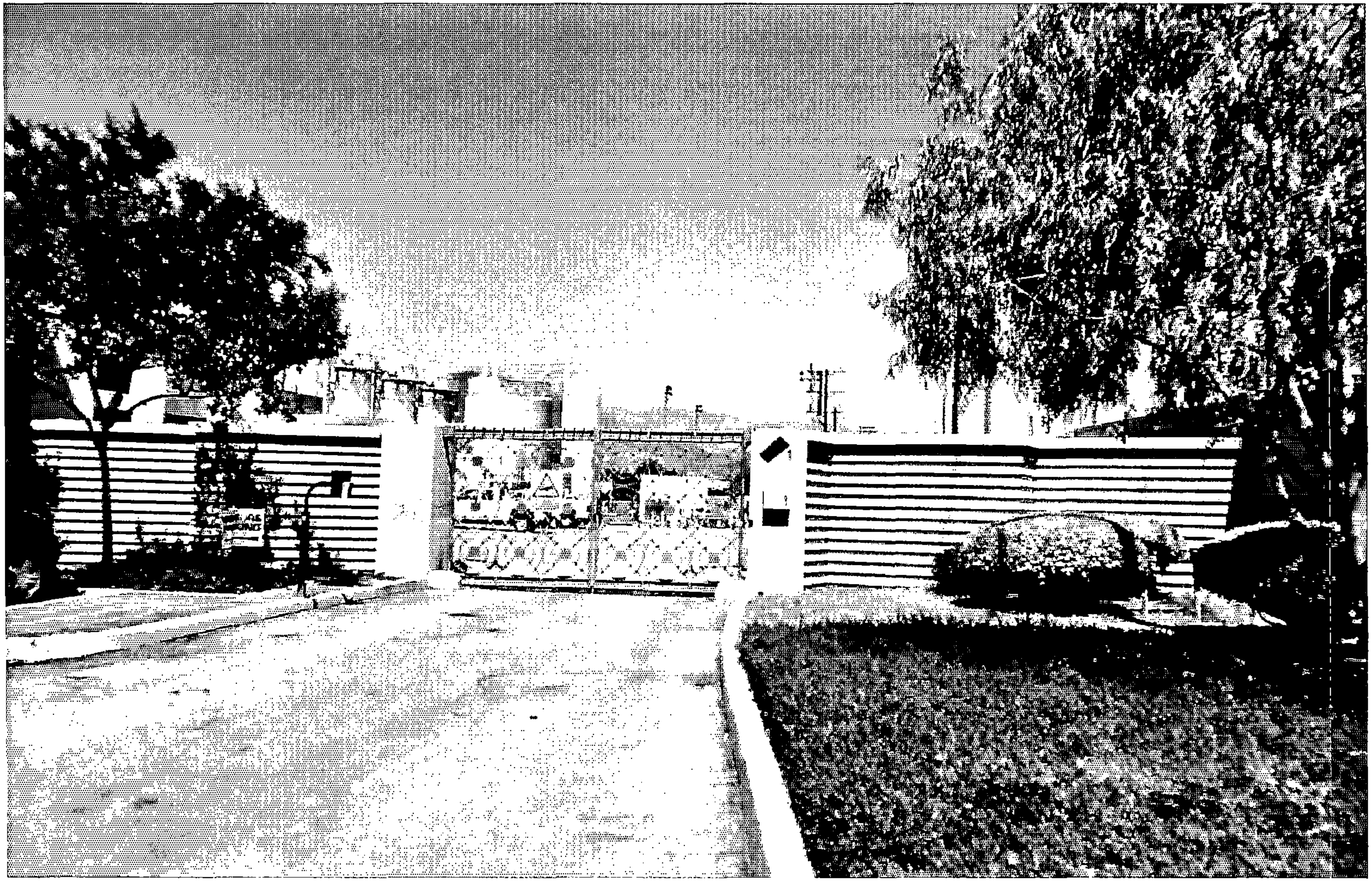


Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Aeration Tower

Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Boiler Room

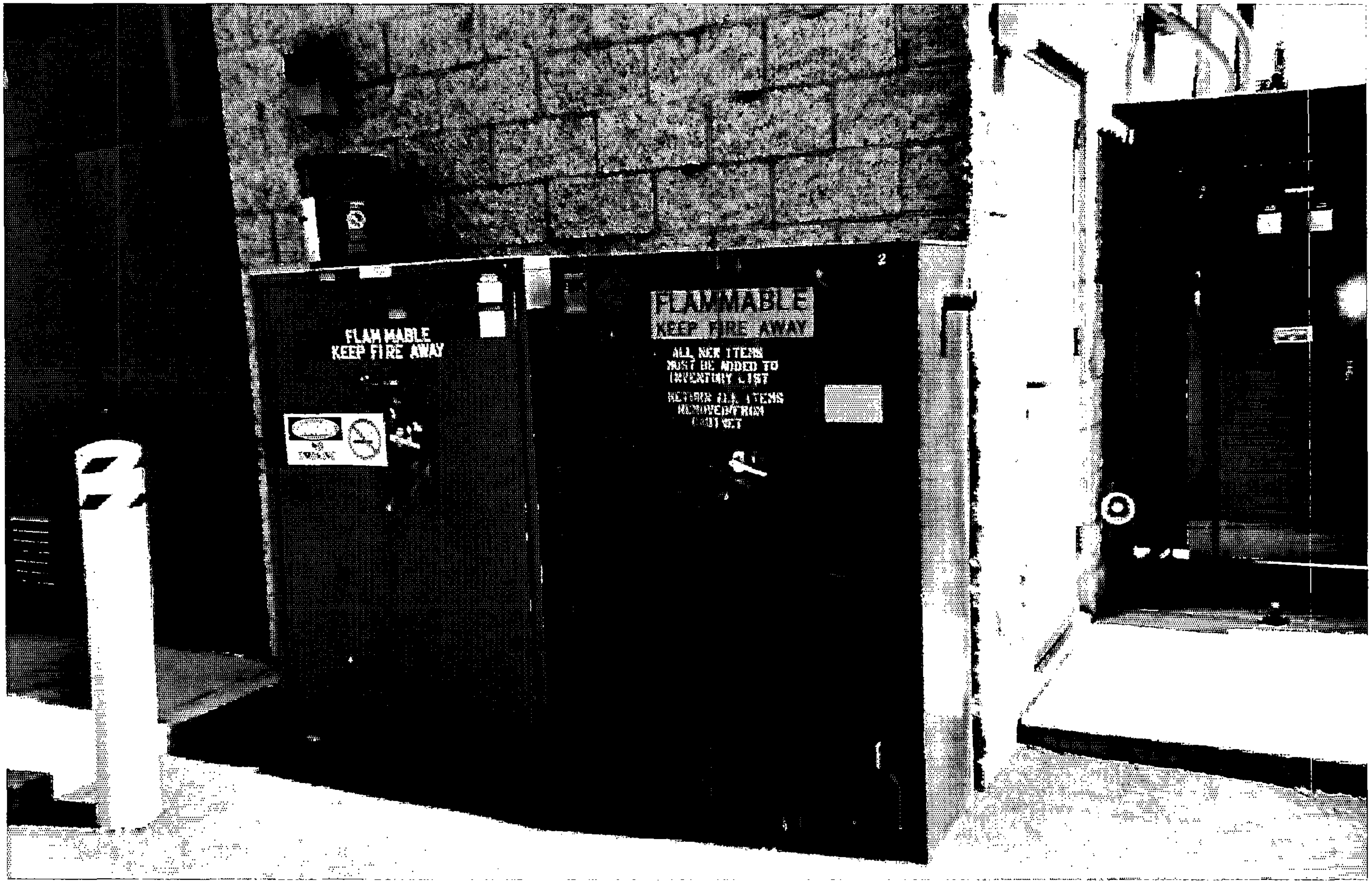


Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Control Box for Well VO4



Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Eastward View of the Burbank Operable Unit

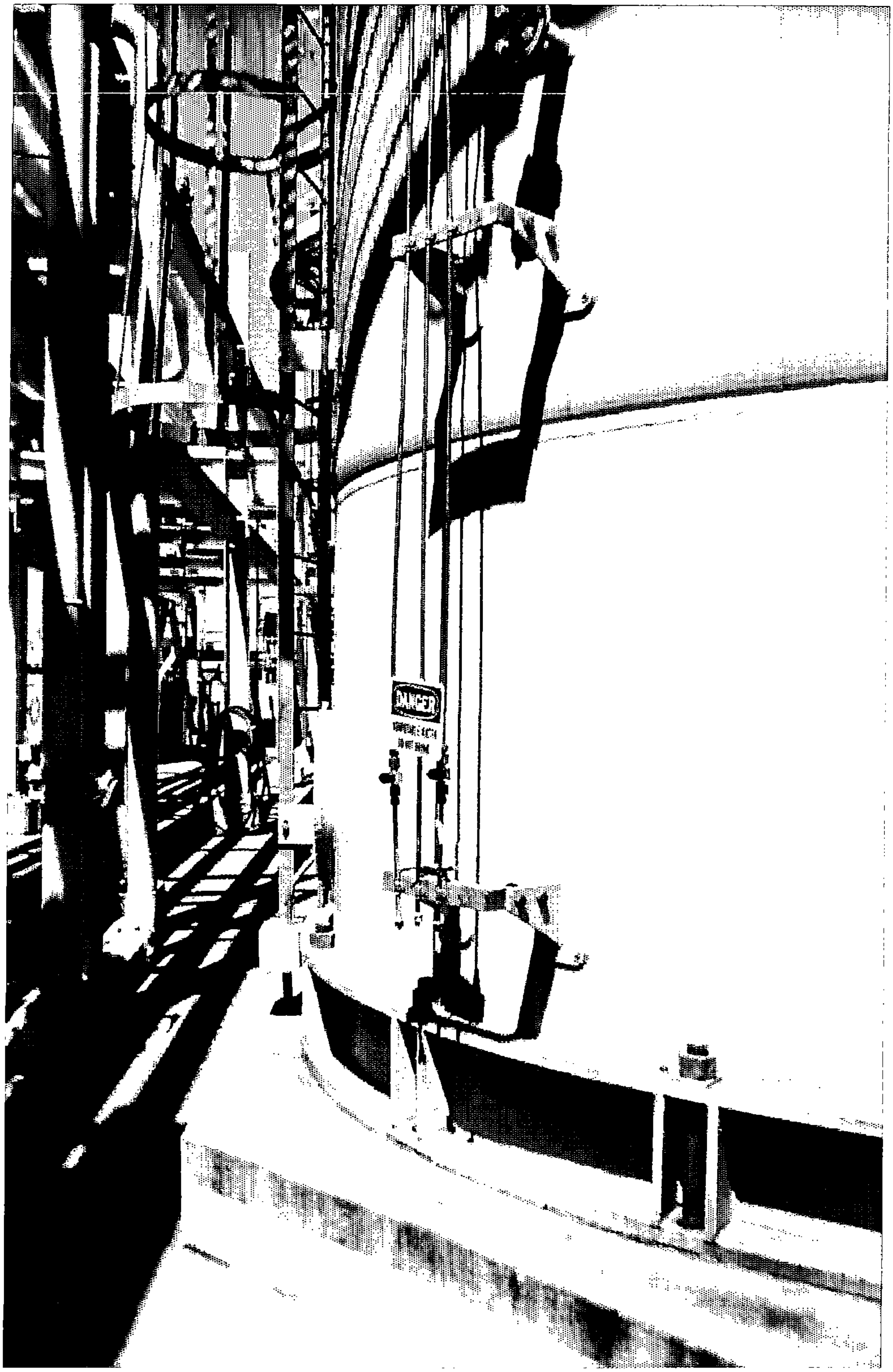
Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Extraction Well VO8



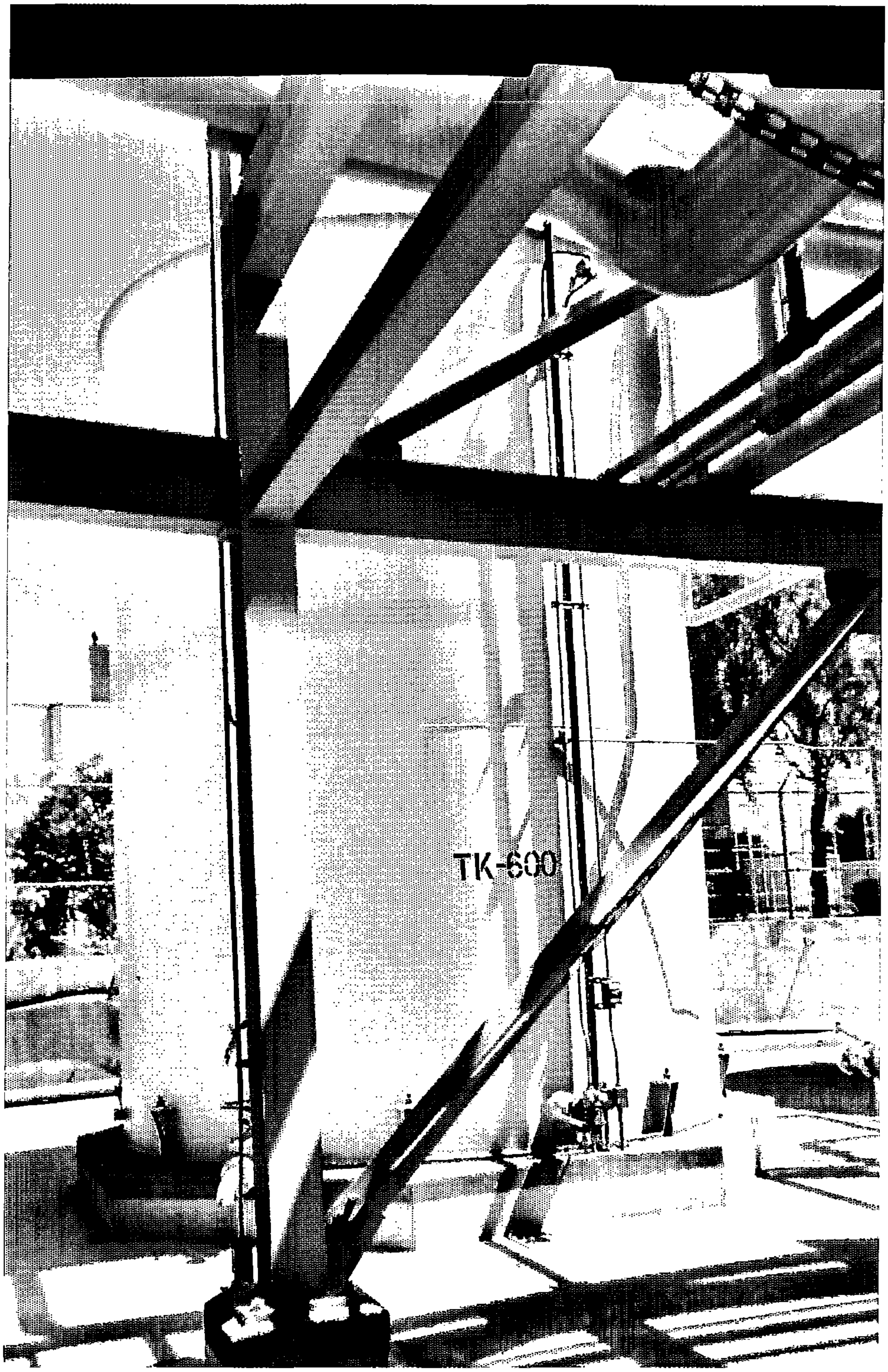
Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Hazardous Materials Storage Cabinet

Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: PGAC Treatment Train and Aeration Tower 2

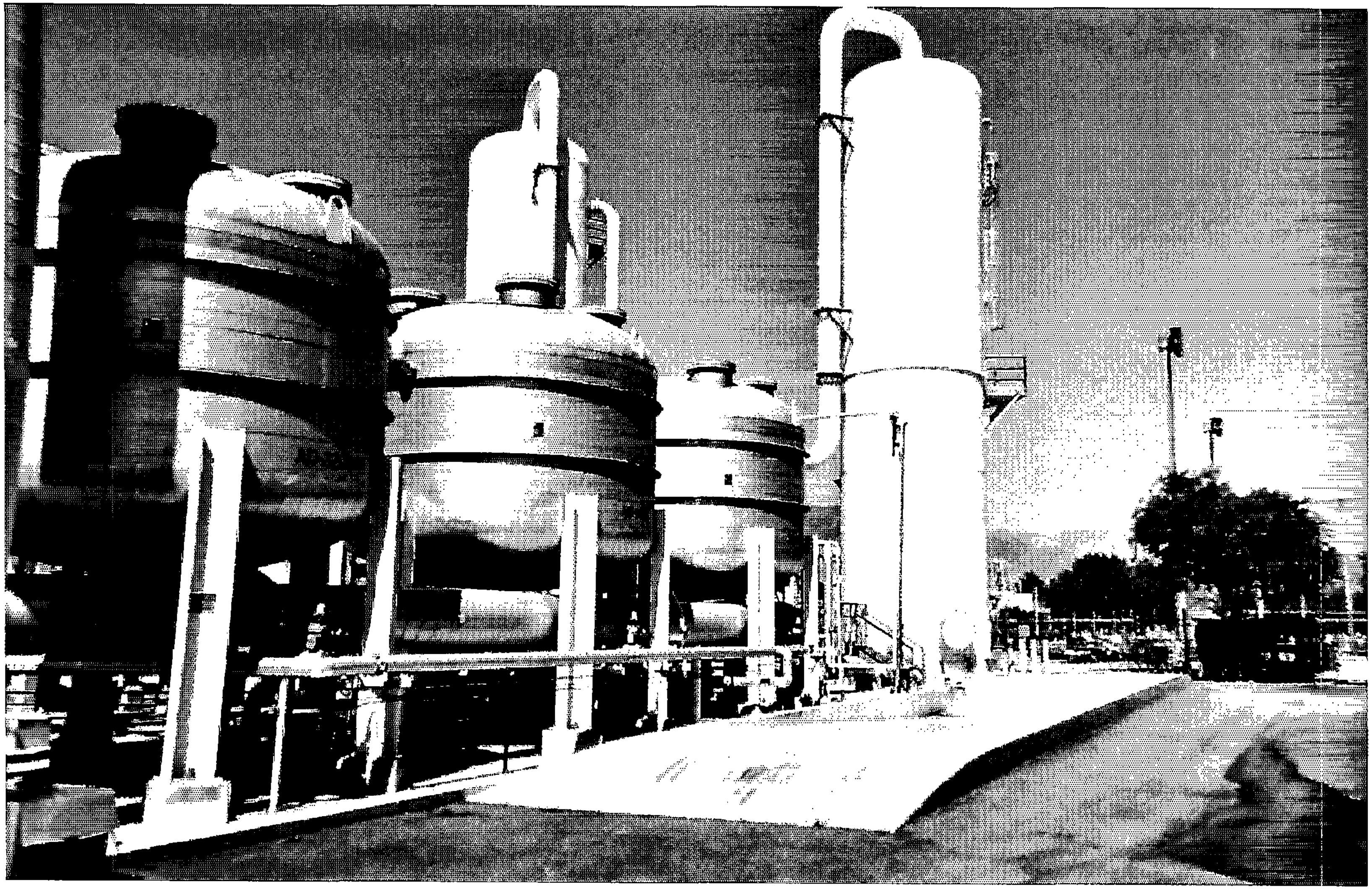
Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Northern Neighboring Property



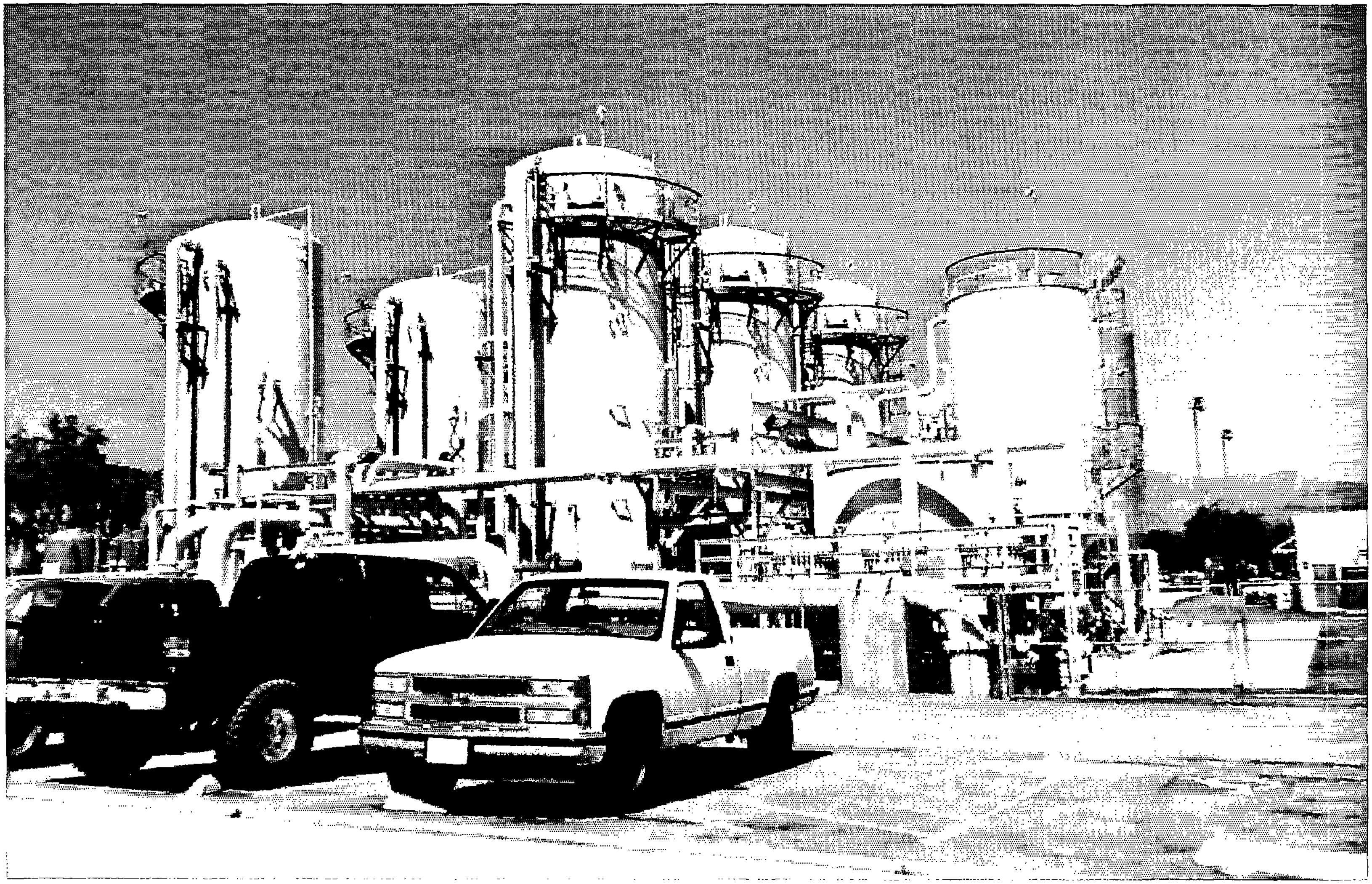
Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: LPGAC Sampling Ports



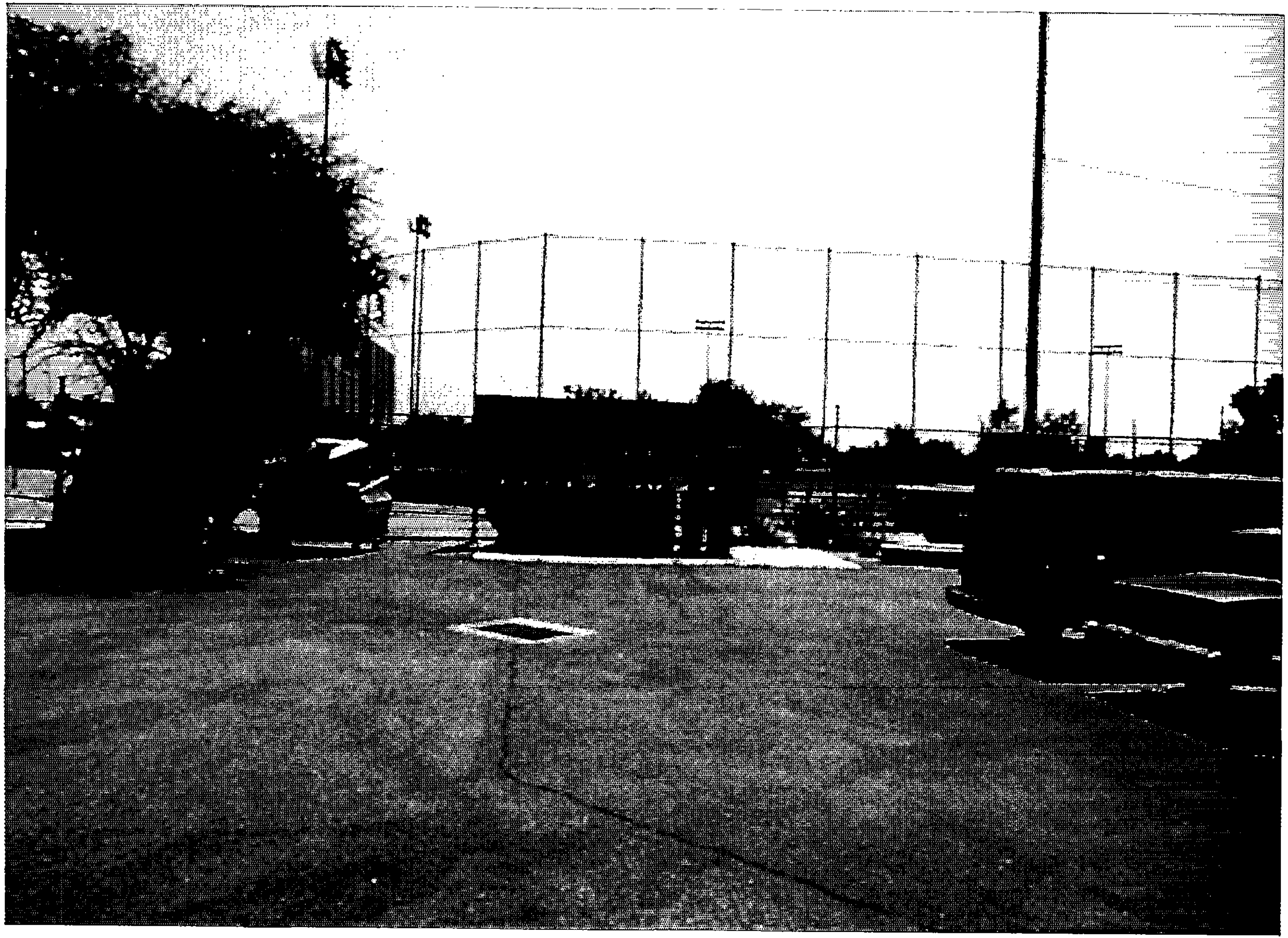
Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Tank-600



Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: VPGAC Treatment Train and Aeration Tower

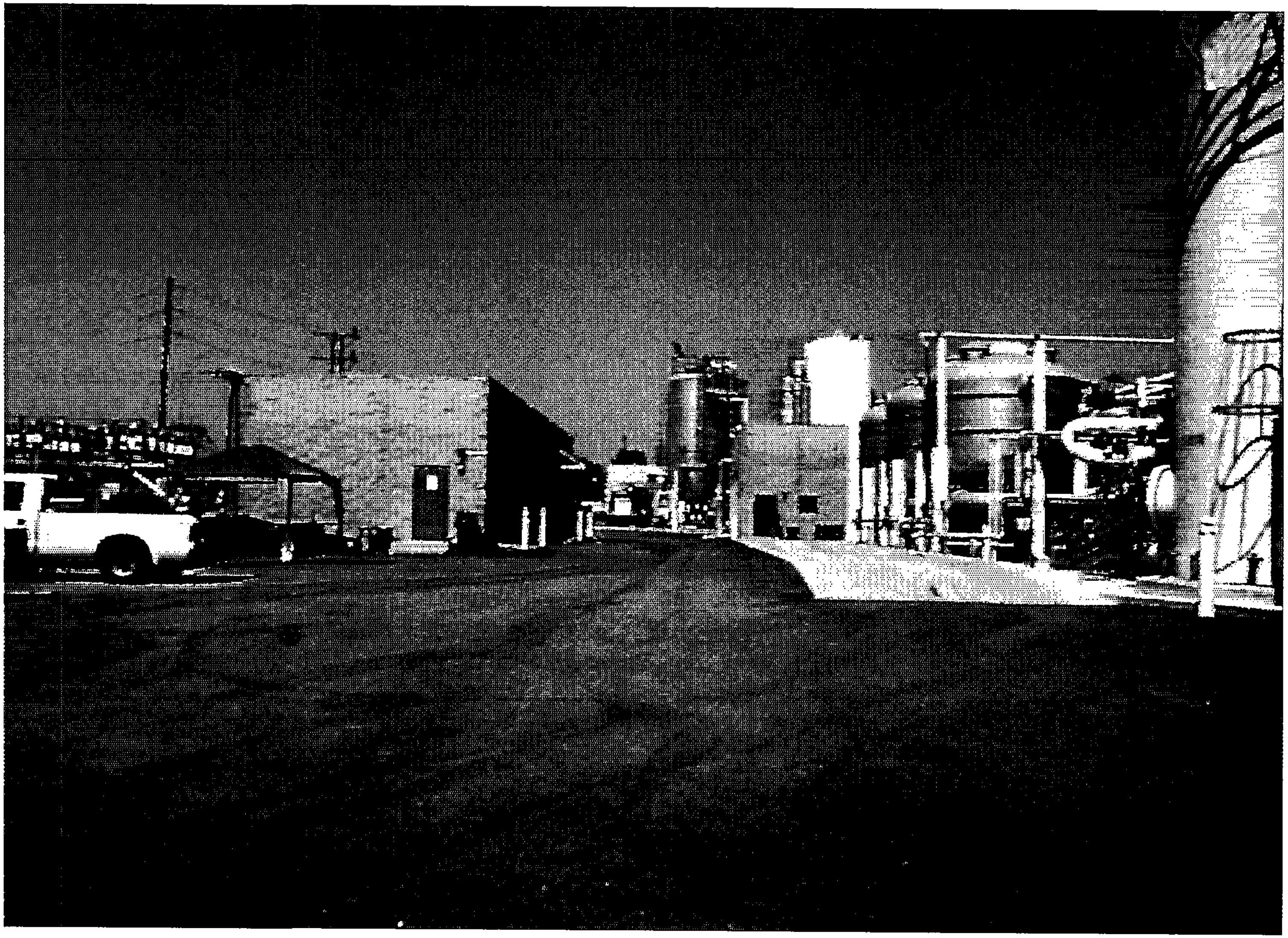


Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: VPGAC Treatment Trains



Photographic Record
Burbank Operable Unit
Date: July 27, 2004
Photographer: Tina Girard/CH2M HILL
Description: Adjacent Property to the East

Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: LPGAC Vessel During Carbon Change-Out



Photographic Record
Burbank Operable Unit
Date: June 1, 2004
Photographer: Tina Girard/CH2M HILL
Description: Westward View of the Burbank Operable Unit